JAMAICA.

# ANNUAL REPORT

OF THE

IMPERIAL MYCOLOGICAL INSTITUTE
2 DEC. 1938

# Department of Agriculture

FOR THE

**YEAR ENDED 31st DECEMBER, 1937.**

*Ordered by His Excellency the Governor to be Printed.*

JAMAICA
GOVERNMENT PRINTING OFFICE, KINGSTON.

1938.

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## Department of Science and Agriculture, Jamaica.

### *Staff.*

| | |
|---|---|
| Director of Agriculture and Island Chemist .. | A. C. Barnes, C.M.G., B.Sc., F.I.C., A.M.I.Ch. E. |

### *Head Office.*

| | |
|---|---|
| Chief Clerk and Personal Assistant to the Director of Agriculture .. .. | George D. Goode, Dip. Agr. |
| Accountant .. .. .. .. | N. B. Donaldson. |
| Second Class Clerks .. .. .. | R. A. White, R. S. Nelson. |
| Librarian .. .. .. .. | Miss E. Marson. |
| Assistants, Typists and Stenographers and Temporary Clerks .. .. | Miss I. R. Mein, Miss V. M. Barrows, Miss R. E. White, Miss D. Wyatt, S. M. Rainford, K. A. Wilson, Miss H. L. E. Chambers, Miss S. J. Russell. |

### *Public Gardens.*

| | |
|---|---|
| Superintendent and Plant Breeder .. .. | M. S. Goodman. |
| Horticulturist .. .. .. | E. J. Downes. |
| Assistant .. .. .. | Miss E. G. McKay. |

### *Agricultural Experiments, Education and Field Services.*

| | |
|---|---|
| Agricultural Superintendent .. .. | R. S. Martinez, Dip. Agr. |
| Superintendent, Sugar Cane Experiments .. | M. S. Goodman. |
| Agricultural Officer .. .. .. | L. L. Carrington, Dip. Agr. |
| Junior Agricultural Officer .. .. | H. C. Miller, D.I.C.T.A. |
| Tobacco Specialist .. .. .. | F. W. Winckley. |
| Headmaster, Farm School .. .. | J. W. Howe, B.S.A., M.Sc. |
| Assistant Masters .. .. .. | L. A. Powell, H. C. Virtue, V. A. Valentine. |
| Temporary Clerk .. .. .. | Miss M. Goodman. |
| Agricultural Superintendent, Grove Place Stud Farm and Experimental Station | A. F. Thelwell |
| Supervising Inspector of Plant Diseases | J. B. Sutherland. |
| | 19 Inspectors. |

### *Live Stock.*

| | |
|---|---|
| Senior Veterinary Officer .. .. | S. Lockett, V.M.D. |
| Technical Assistant .. .. .. | W. F. Hutchinson |
| Superintendent, Hope Stock Farm .. .. | J. W. Howe, B.S.A., M.Sc. |
| Foremen, Hope Stock Farm .. .. | G. E. Redshaw, R. A. Amiel. |
| Clerk and Storekeeper, Hope Stock Farm .. | L. S. Marston. |
| Stock Inspector .. .. .. | T. P. Lecky. |
| Superintendent of Stock Grove Place Stud Farm | E. U. Lewis. |
| Clerk, Grove Place Stud Farm .. | R. N. Lewis |
| Temporary Clerk, Grove Place Stud Farm | Miss M. Masters |

### *Research and Laboratories.*

| | |
|---|---|
| Deputy Island Chemist .. | W. L. Barnett, M.A., B.Sc., F.I.C. |
| Entomologist .. .. | W. H. Edwards, D.I.C., F.E.S. |
| Agricultural Chemist .. .. | H. H. Croucher, B.Sc. |
| Botanist .. .. | L. N. H. Larter, B.Sc., A.R.C.S., A.I.C.T.A. |
| Assistant Chemist .. .. | E. N. Richards. |
| Temporary Assistant to Agricultural Chemist | W. K. Mitchell, D.I.C.T.A. |
| Assistant Agricultural Officer .. | L. B. Robinson. |
| Technical Assistants .. .. | E. K. P. Blake, O.W. Harrison, D. C. Davis, W. B. Dixon, Z. A. Daniels, D. A. L. Segre, J. H. Haughton. G. A. Little, R. D. Hill, L. E. Thwaites, K. A. Gayle. |
| Clerk and Stenographer .. | L. A. Boothe. |
| Typist and Stenographer .. | Miss E. J. Gordon. |

*Produce Protection.*

| | |
|---|---|
| Chief Inspector of Produce .. | P. W. Murray. |
| Inspectors of Produce .. | R. C. Somerville, A. M. Douet, H. B. Monteith, I. H. Campbell, C. M. G. Purchas, T. V. Thomson. |
| Secretary .. .. .. | Miss U. E. Foster-Davis. |
| Typist and Stenographer .. | Miss C. D. Levy. |

*Low Temperature Research Station.*

| | |
|---|---|
| Plant Pathologist .. .. | F. S. Ward, B.S.A. |
| Junior Agricultural Officer .. | J. M. McEwen, D.I.C.T.A. |
| Do. do. .. | E. A. Tai, D.I.C.T.A. |
| Accounting Clerk .. .. | W. W. Woolcock. |
| Mechanic and Electrician .. | A. J. McDowell |
| Technical Assistant .. .. | Z. A. Daniels. |
| Typist and Stenographer .. | Miss L. Palomino. |

*Marketing Division.*

| | |
|---|---|
| Development & Marketing Officer | F. E. V. Smith, B.Sc. |
| Manager .. .. | G. K. Argles. |
| Asst. Manager .. .. | E. G. Whitbread. |
| Asst. Manager (Accounting) .. | R. A. Crosswell |
| Junior Agricultural Officer .. | R. C. Bridge |
| Do. do. .. | D. L. Foster, D.I.C.T.A. |
| Field Assistant .. .. | W. D. Marr. |
| Clerk to the Development and Marketing Officer | Mrs. Beryl Vernon. |

# DEPARTMENT OF SCIENCE AND AGRICULTURE.

**Report for the Year ended 31st December, 1937.**

## SECTION I.—AGRICULTURE IN THE COLONY.

### Staff.

The following staff changes took place during the year:—

*New Appointments.*—

Mr. F. S. Ward was appointed Plant Pathologist to act during the period of secondment of Mr. F. E. V. Smith as Development and Marketing Officer.

Mr. G. K. Argles was appointed Manager of the Marketing Division which was established during the year, and Messrs. E.G. Whitbread and R.A. Crosswell were appointed Assistant Managers.

Mr. Trevor V. Thomson was appointed an Inspector of Produce.

Mr. T. P. Lecky was appointed Stock Inspector.

Miss M. Masters was appointed Temporary Clerk, Grove Place Stud Farm and Experimental Station.

Mr. D. L. Foster, a graduate of the Imperial College of Tropical Agriculture was appointed a Temporary Junior Agricultural Officer.

Mr. W. D. Marr, an Agricultural Instructor, was appointed Field Assistant at the Low Temperature Research Station.

Mr. L. B. Robinson was appointed Temporary Assistant Agricultural Officer in connection with Banana Breeding work.

Mrs. B. Vernon was appointed Clerk to the Development and Marketing Officer.

Miss L. Palomino was appointed Typist and Stenographer at the Low Temperature Research Station.

Miss E. J. Gordon was appointed Typist and Stenographer at the Government Laboratories.

Messrs. K. A. Wilson and S. M. Rainford were appointed Assistants on the clerical staff of the Head Office.

*Secondments.*:—

Mr. F. E. V. Smith, Plant Pathologist, was seconded to act as Development and Marketing Officer.

Mr. A. F. Thelwell, Agricultural Superintendent, Grove Place, was seconded to act as Secretary of the Jamaica Agricultural Society, and Mr. L. A. Powell, Assistant Master of the Government Farm School, was seconded for duty as Agricultural Superintendent, Grove Place.

Mr. J. McEwen, Junior Agricultural Officer, was seconded to act as Senior Assistant Master at the Government Farm School.

*Retirement.*—Miss I. R. Mein, who had served as a Typist and Stenographer in the Head Office since 1923, resigned her appointment during the year.

*Leave.*—During the year the following officers were absent on leave:

| | |
|---|---|
| Head Office— | |
| Hon. A. C. Barnes, Director of Agriculture .. | From 6th July to 6th November. |
| Mr. R. A. White, Scond Class Clerk .. | From 1st December to end of year. |
| Miss I. R. Mein, Typist and Stenographer .. | From 11th Jan. to 21st Feb., and from 17th June to 30th June. |
| Miss M. Barrows, Typist and Stenographer .. | From 6th December to end of year. |
| Public Gardens— | |
| Miss E. G. McKay, Assistant .. .. | From 26th July to 5th Sept. |
| Farm School— | |
| Mr. V. A. Valentine, Asst. Master .. | From 30th Aug. to 11th Sept. |
| Miss M. Goodman .. .. .. | From 9th Aug. to 5th Sept. |

| | |
|---|---|
| Government Laboratories— | |
| Mr. L. N. H. Larter, Botanist .. .. | From 23rd November to end of year. |
| Mr. W. B. Dixon, Technical Assistant .. | From 27th Sept. to 21st November. |
| Mr. D. C. Davis do. .. | From 26th April to 20th June |
| Mr. G. A. Little do. .. | From 3rd August to 30th August |
| Mr. E. K. P. Blake do. .. | From 9th August to 22nd August. |
| Produce Protection Division— | |
| Mr. H. B. Monteith, Inspector of Produce .. | From 5th May to 1st July. |
| Mr. I. H. Campbell do. .. | From 15th June to 10th September. |
| Miss U. Foster-Davis, Secretary .. | From 3rd August to 6th September. |
| Low Temperature Station— | |
| Miss L. Palomino, Typist and Stenographer .. | From 25th October to 5th December |
| Marketing Division— | |
| Mr. H. C. Miller, Junior Agricultural Officer | From 1st June to 31st July. |

## Production.

2. Weather conditions were generally favourable throughout the year. Certain localities experienced dry weather during October and November, while in November flood rains and serious landslides occurred in Portland and some damage was done in St. James. The production of the Colony's main crops was good, and banana exports constituted a new record of almost 27 million stems (actual figures 26,955,489 equivalent to 17,600,579 counts).

3. The total value of the Colony's domestic exports as determined by Customs returns closely approached £5,000,000 (actual figure £4,816,872), an increase of £1,119,264 over the value of domestic exports for the previous year. Of this increase nearly three-quarters of a million (£745,278) was accounted for by bananas and the balance of £373,986 by miscellaneous products, principally sugar and rum. Sugar showed a further noteworthy increase in exports from 77,809 tons in 1936 valued at £632,451, to 95,776 tons in 1937 valued at £864,579; an increase of 17,967 tons in quantity and £232,128 in value.

The Rum position also continued to improve, exports increasing by 232,477 gallons over the 1936 figures, the total exports in 1937 being 903,812 gallons valued at £266,051—an increase in value over the previous year of £71,406.

4. Coconut exports increased both in quantity and value.

5. Citrus fruits declined both in quantity and value, principally because of unattractive overseas markets. Freight rates continued to be high and although some reduction was made, further action appears to be necessary in the interest of this growing industry. Continued efforts are being put forth to produce standardised varieties of fruit which when available in sufficient quantity will improve Jamaica's position in export markets and again bring the Colony to the fore as a producer of first class citrus fruits. The markets do not want our mixed seeded varieties.

6. It is noteworthy that the increases in the value of exports of bananas, sugar, rum and coconuts do not account entirely for the £1,119,264 by which our export trade exceeded in value that for the previous year. Despite the decline in the value of citrus exports, products other than those regarded as the island's principal exports showed an increase in value over the previous year of £51,146, which was well distributed over numerous comparatively small, though nevertheless important items. The organised production of tobacco for export showed up for the first time in our trade returns for 1937, while a remarkable increase took place in the export of numerous minor products dealt with by the Government Marketing Station of the Department of Agriculture. The export figures indicate that the Colony's minor products are gradually coming into greater prominence and that there is a welcome tendency towards more balanced agriculture with greater attention to the numerous crops which can be produced by the small settler. Thus there was an increase in value of unclassified minor products of some £45,000 over the previous year.

## Cercospora Leaf Spot of Bananas.

7. It is remarkable that banana production increased during the period when Leaf Spot Disease, caused by the fungus *Cercospora musae* showed up in a serious form in four banana producing districts. This disease is associated with other troubles affecting the banana, which, in the aggregate, may render this crop unprofitable in limited areas unless the most careful steps are taken to conserve and restore soil fertility and to "cultivate" as well as to "plant." Careful field enquiries have been instituted by the Department of Agriculture since this disease first appeared in serious form in the middle of 1936 and a campaign is being undertaken for the protective treatment of plants, combined with proper tillage operations and the application of fertilizers.

8. The field staffs of the Department of Agriculture and of the Agricultural Society are uniting in the prosecution of this work. The results of the field studies undertaken by one of the Fruit Companies are placed at the disposal of the Government. In addition to amounts already provided a further sum of £5,000 has been authorised for special expenditure in connection with banana diseases, other than Panama Disease. The last named continues to decimate banana fields. It is still, and is likely to remain the most serious trouble facing the banana planter.

9. The continued production of a single crop, without rotation, and in many cases without any attempt to maintain the fertility of the soil must in time lead to a loss of quality as well as a reduction in quantity of the product, and it is necessary, therefore, that all concerned should redouble their efforts both to study the various problems involved and to apply the results of experience to planting practice.

10. Two special cold storage trials carried out with fruit from infected and non-infected areas failed to show any difference in behaviour under cold storage conditions. Shipping trials conducted by one company have confirmed this observation. There is thus no reason to fear that fruit otherwise suitable for shipment will break down during transit or ripening if it comes from areas with Leaf Spot.

## Banana Breeding.

11. In addition to other measures steps have been taken on the advice of the Colonial Advisory Council on Agriculture and Animal Health to speed up the work of banana breeding by providing facilities for extended studies by the Botanist in Jamaica, as well as by the introduction of new wild varieties principally from the Far East. It is an encouraging fact that the seedling varieties of banana show a high degree of resistance to Leaf Spot Disease, and though the primary object is to develop a new commercial type banana immune to Panama Disease, the possibility that such a type will also be highly resistant to Cercospora Leaf Spot is important.

## Banana Borer.

12. The Banana Borer has also received attention and insects have been introduced from Fiji and from Malaya to combat it.

## Banana Fertiliser Experiments.

13. The banana fertilizer experiments undertaken with funds provided by the fruit companies are now approaching a stage where conclusive results are promised and have already developed sufficiently far to indicate the types of fertilizers which will be most suitable to particular soil conditions in different parts of the island.

## Sugar.

14. The sugar industry, not only of Jamaica but of the whole world, came under prominent review during 1937 and a World Restriction Agreement was negotiated in London. The production of the Colonial Empire was regarded as a single unit during the discussions and was later sub-divided under a quota system amongst the different Dominions and Colonies producing this commodity. The export quota allotted to Jamaica for the current season is 86,000 tons. The results of this World Agreement cannot yet clearly be foreseen in its effect upon our production.

15. Sugar-cane may properly be regarded as Jamaica's main crop, exceeding as it does a production of one million tons per annum, and it is of first importance to take every possible step to maintain the sugar industry of the island on a firm, profitable and continuing basis. It has now been necessary to bring production under control in order to give effect to the participation by the Colonial Empire in the World Sugar Agreement. The Sugar Industry Control Law 1937, passed by the Council last December, has now been put into operation and the Sugar Control Board appointed under that Law is busily at work. The average yield of sugar cane per acre over all classes of cane was 29.08 tons in 1937.

16. The Jamaica Association of Sugar Technologists, formed late in 1936, held its first conference at Hope in November, 1937. The objects of this Association are to bring together the members of the staffs of sugar estates in the branches of administration, field production, engineering and chemical control, for the consideration and discussion of various technical problems in connection with the production of sugar. The Association is in no sense a Trade Union but rather a scientific organization.

## Citrus.

17. Although citrus exports declined in 1937, a careful survey of the position indicates good prospects for the future. The careful inspection, not only of citrus fruits but of other produce leaving the island, undertaken by the Inspectors appointed under the Agricultural Produce Law, continues to enhance the regard in overseas markets for our exports. The quantity of fruit shipped to New Zealand during the current season has declined somewhat, partly because of the admission of Australian citrus to that Dominion. It is highly satisfactory to note, however, that exporters here have received orders for considerably greater quantities for next season.

18. The Government citrus nurseries continue to be maintained and the demand for plants is still high. Some of the earlier plantings under the Citrus Development Scheme are now coming into bearing. The fruit is of good quality, having regard to the age of the trees, and experienced planters who have established this crop are well satisfied that they have made a sound investment. The citrus fertilizer trial established at Grove Place is beginning to produce valuable results. A second experiment of a similar nature is now being undertaken at Wakefield in St. Catherine.

## Fruit and Vegetable Scheme.

19. Special agricultural developments have been proceeding on three lines during the year. The Fruit and Vegetable Scheme advanced a further stage with the approval of funds to erect and equip a new packing house in Kingston and to provide staff for a period of three years. The new building which contains a citrus packing plant adapted for limes, a lime oil still, two pre-cooling rooms and miscellaneous equipment, was ready for occupation by the end of the year. The extension of this scheme necessitated a considerable increase in staff, while the increased quantities of produce handled has given employment to a larger number of workers than formerly.

20. During the 1937 season, from the 1st November, 1936 to 31st October, 1937, some 33,900 packages were shipped to England, Canada, the United States, and Bermuda compared with some 17,230 packages for the previous season. Fruits totalled about 17,500 packages, principally limes and mangoes. The more important vegetables were new potatoes, egg plants, sweet peppers and string beans, with smaller shipments of tomatoes.

21. A staff of field officers has been actively engaged in advising and assisting growers, principally in the Spanish Town, Old Harbour and Manchester areas. Many of those growers have had little previous experience in the cultivation of vegetable crops so that it has been necessary to provide them with practical

assistance in planting, spraying and harvesting. Unfortunately the weather during the early part of the present growing season was abnormally wet and this detrimentally affected many of the crops in the Spanish Town and Old Harbour areas. The encouragement given by the Government, combined with the regulation of vegetable exports under the Agricultural Produce Law has stimulated interest in these crops. The establishment of tomato growing in certain districts of southern St. Elizabeth is a welcome feature of this new development.

22. The staff of this new division includes provision for field production, collection and receiving of produce, general supervision of field and packing-house work, accounting and correspondence. The whole division is under the immediate control of the Development and Marketing Officer who is responsible to the Director of Agriculture for the proper conduct of the work.

23. The Low Temperature Station is now in a position to fulfil the functions for which it was established —the investigation of cold storage problems of local importance in connection with bananas, citrus, and fruits and vegetables generally. It is being brought into increasing use for bananas, both in the study of the effects of plant diseases on the fruit, and for the testing of the fruit of promising seedling bananas now becoming available in greater numbers.

## Tobacco.

24. The organised production of cigar leaf tobacco for export, commenced in 1936, is continuing successfully. The Tobacco Conditioning, Grading and Packing Station was opened at "Clifton Pen" in February, 1937, and was doubled in size towards the end of the year in readiness for the crop planted during the current season, which is expected to reach at least 200,000 lbs. A total of 61,913 lbs. gross weight of tobacco was delivered to the Station from the 1936 crop. Twenty independent growers sent in their tobacco for curing, grading and shipping, and four exporters had their tobacco examined at the station prior to export, in accordance with the Tobacco Regulations. The total advances to growers during the 1936-37 season amounted to £1,597, of which all but £170 has been recovered. Average yields exceeding 900 lbs. cured leaf per acre were obtained from the Government experimental plots indicating that growers can secure high returns with proper care. At two of these centres yields of 1,400 lbs. and 1,100 lbs. per acre respectively were obtained. Thirty-seven growers are being assisted for the 1937-38 crop in respect of 250 acres, while outside growers are expected to plant 100 acres of tobacco for export.

25. Reports on the tobacco are generally highly favourable and indicate good prospects, provided that the necessary care and attention is given to detail at all stages. Apart from the labour employed in the field, the Government Tobacco Station gave employment to an average of 50 women daily from the beginning of March to the middle of October in 1937, the total number of working days being 11,708.

26. The costs of grading, curing, packing and shipping for the 1936-37 crop were 4.2 pence per lb. and the average price slightly exceeded 1/- per lb. c.i.f. It is expected that the higher production during the present season will result in a slight reduction of the station costs.

27. Small production trials of Virginia leaf have been carried out during the present season. The Government Tobacco Scheme has mainly concerned itself with the production and marketing of cigar leaf tobacco but considerable attention has been devoted to other types of tobacco which can be successfully grown in various parts of the Island not suited for the cigar types. Trial plots have been established in various districts and samples of cured leaf from those, as well as others supplied by independent growers are being collected with the object of determining whether markets for them can successfully be established.

## Nutrition.

28. The most recently introduced investigation is that of a range of food crops which can be produced locally but which are now largely imported. Legislative Council approved of a scheme involving an expenditure of £7,900 over a period of three years to be provided by a grant from the Colonial Development Fund. The special officers required for this work have arrived in the island and the extension to the laboratory of the Agricultural Chemist is rapidly nearing completion. Enquiries have gone out to a great number of countries for supplies of varieties of food crop seeds which will be included in the trials. A commencement has been made with the analysis of food crops already grown in the island, for which no analytical data at present exist.

## Irrigation Investigations.

29. A detailed soil survey of an area of about 40 square miles in South Clarendon has been completed and apart from its relation to the Irrigation Scheme under consideration for that area, has provided valuable data in regard to the properties of soil types which exist, not only in that district, but over considerable other areas in the island. A further irrigation scheme in regard to which hydraulic surveys have been completed, is under consideration for an area to the westward of the Rio Cobre Irrigation System. The possibility of providing assistance to private individuals who desire to install well irrigation systems is under consideration.

## Stock Industry.

30. The health of stock on the whole has been good but a severe outbreak of Swine Fever caused high mortality in districts of western Kingston and lower St. Andrew. The services of the Stock Inspector for which provision was made in the estimates for 1937-38, have proved popular and valuable to stock owners in the district of Manchester in which he is stationed.

## Agricultural Education.

31. The enrollment at the Farm School for the year was 52 students, the highest number since 1931. The school had a highly successful year in sporting activities, while one of the pupils, G. B. Grant, won the 1,500 and 5,000 meter races at the Panama Olympic Games recently. Three hundred and fifty-eight persons visited the school and Farm at Hope during 1937.

32. The annual Staff Conference was held in January, 1938, and the Summer Course of Lectures and Demonstrations in July, 1937. Public meetings were organised and attended and addresses given by the Director and staff on numerous agricultural subjects, including diseases of the banana, with special reference to Cercospora Leaf Spot.

## Exhibitions.

33. An excellent exhibit was staged at the British Industries Fair in February, 1937. A fine display of fruits and vegetables was made at the Imperial Fruit Show and Canners' Exhibition held in Birmingham during October, 1937. Arrangements in England for these exhibitions are made on behalf of Jamaica by the West India Committee, with whom are associated Messrs. T. J. Poupart Limited.

34. Reference has been made in previous reports to the development of closer relations between the Department and the Jamaica Agricultural Society, so necessary to the successful application of ascertained facts to general agricultural practice. It is highly satisfactory to record that the two have now been more effectively united by the decision of the Board of Management of the Jamaica Agricultural Society to give executive authority to the Instructors' Committee, and to appoint the Director of Agriculture to be Chairman of that Committee. This arrangement became effective in July, 1937. The union was strengthened by the secondment of Mr. A. F. Thelwell to be Secretary of the Society for a period of two years, from October 1st.

The Instructors' Committee has zealously carried out its responsibilities and gives promise of providing permanently a strong and necessary link between the two organisations which should indeed have long ago been forged. Agriculture demands united and unremitting service directed to the practice of efficient and effective crop production methods combined with soil conservation under a wide range of conditions. This can only be given by a loyal and intelligent staff working on carefully planned lines which are determined by research, investigation, observation, and direction.

35. Approval was given by the Legislative Council for the establishment of demonstration plots on land settlements. These plots were placed under the control of the Instructors' Committee of the Jamaica Agricultural Society and five were in course of development by the end of the year, by which time considerable progress had been made. The object is to show by a practical example to small holders on settlements how small holdings can be successfully and rapidly developed. It is recognised that most peasants who take up land on settlement schemes have not the means of progress as quickly as is desirable, nor have they the knowledge, but practise a system of agriculture best adapted to the land they take up. At the end of the year the agricultural aspect of land settlement work was expanding to include arrangements for more active and effective assistance to small holders.

36. In general it may be said that the co-ordination of agricultural services was continued effectively during the year. By the end of the period under review the duties, both departmental and extra-departmental, devolving upon the Director of Agriculture, had increased very considerably, while the work of the Department as a whole had also become greater. The presence of the Director of Agriculture on numerous Boards and Committees, usually in the capacity of chairman, appears under the present system to be essential if the work of Government in relation to agricultural research and investigation, expansion of production, plant protection, agricultural field services, including instruction and demonstration, land settlement, agricultural credit, and development of new agricultural industries, is to be properly and effectively correlated.

## Acknowledgment of Services.

37. During the past few years the agricultural services have been brought much closer together with increasing benefits to all classes of the community. The extensive and varied work of the Department in these circumstances is only possible by unremitting attention to duty by all grades and by the full and sincere co-operation of the staff which I again most gratefully acknowledge.

38. The activities of the different divisions of the Department are set out in detail in reports submitted herewith, by the principal officers concerned, who have furnished summaries to facilitate reference.

39. In addition to acknowledging the services of the staff of the Department I desire to place on record my very warm appreciation of the unremitting help given by members of the various Boards and Committees associated with agricultural work and particularly that of the Jamaica Agricultural Society which, through its Board of Management and Instructors' Committee has done much during the year to increase the value of the agricultural services to the community.

A. C. Barnes,
Director of Agriculture.

## Summaries of Divisional Reports.

### *Summary of the Report of the Superintendent of Public Gardens and the Horticulturist.*

Weather conditions were favourable and there was no damage by flood rains.

Several hybrid orchid seedlings raised during the period 1930-1932 by the asymbiotic method flowered for the first time during the year under review.

The rose garden has been remodelled and planted with varieties of roses which are suitable to the lowland conditions.

A design in the form of a crown to commemorate the Coronation of Their Majesties King George VI and Queen Elizabeth was laid out and planted with coleus varieties.

The Central Drive was closed to vehicular traffic and is now used by pedestrians only.

An avenue of Talipot palms was planted on both sides of the main road between the Government Laboratory and the main entrance to the Gardens and is to be named the Coronation Avenue.

The Band Concerts given by the Jamaica Military Band have become a popular feature.

The Public Gardens were satisfactorily maintained.

M. S. Goodman,
Superintendent of Public Gardens.
E. J. Downes,
Horticulturist.

*Summary of Report of Superintendent Experiment Station, Hope.*

The free distribution of large numbers of cuttings of cane varieties was made to Estates and Cane Farmers.

Large numbers of cuttings of MPR. 28, FC.916 and POJ.2878 were distributed as compared with the other varieties.

A number of tested and untested new seedling varieties was received from the Central Quarantine Station, Trinidad.

M. S. Goodman,
Superintendent, Experiment Station.

*Summary of the Report of the Superintendent of Sugar-cane Experiments.*

The rainfall during the year was fairly well distributed in the cane areas with the exception of Trelawny where it was dry in periods.

The increase in production of sugar manufactured over last year was approximately 15,000 tons. This increase was due partly to climatic conditions, enlarged acreage and increase in production per acre.

Manurial and cane variety experiments were reaped this year and the results will be dealt with by the Agricultural Chemist. Additional manurial and cane variety experiments were laid down.

The average yield of cane per acre over the island has been a record. Yields of over 60 tons per acre have been commonly obtained. A yield of over 80 tons per acre has been obtained with E.K.28 from a fairly large field. This increase is partly due to climatic conditions and better methods of cultivation.

Cane farmers have become prominent in the production of cane for the factories. Their output has now reached about 23% of the total cane ground at the factories.

M. S. Goodman,
Superintendent of Sugar-cane Experiments.

*Summary of Annual Report of Headmaster Farm School for year ending December* 31*st* 1937.

The total enrollment for the year was 52 students, an increase of three over the previous year and the highest enrollment since 1931.

At the Annual Graduation 11 students were awarded Diplomas in Practical Agriculture and three students were awarded Certificates in Practical Agriculture.

The school had a very successful year in sport, tieing for first place in the Evelyn Cup Cricket Competition and winning the Cup in the Third Division Football Competition.

The Third Year Students spent half of each term at Grove Place, and at both Grove Place and Hope a number of trips into the country were made, where they visited properties and institutions.

The Farm School staged an exhibit of work at the Knutsford Park Show on February 24th.

A Rover Crew was organized at the school in October with 16 members.

The Farm School continued to be popular as a centre for holding meetings and conferences, and during the year the number of visitors to the school was 358.

A change in staff was made when Mr. L. A. Powell, Senior Assistant Master was seconded for duty at Grove Place as Agricultural Superintendent. Mr. Powell's place was taken by Mr. McEwen.

J. W. Howe,
Headmaster.

*Summary to Annual Report of Farm Superintendent for year ending December* 31*st*, 1937.

The year under review was an average one in the Liguanea Plain and although the rainfall was less than the previous year the distribution, especially during the latter part of the year, was considerably better.

There was an increase of 39 head of stock over the previous year with a slight decrease in total value. The price of butcher stock increased slightly towards the end of the year.

During the year 167 calves were dropped. Two animals were purchased, one purebred Red Poll bull and one purebred Guernsey bull. The health of the livestock during the year was good and livestock sales, were up to the average.

Milk production showed an increase of 10,380.25 quarts over the previous year while milk sales showed an increase of 15,298.50 quarts. A total of 1,824.75 pounds of butter was made during the year and sold to the Mental Hospital.

The average daily production per cow showed a slight increase over the previous year, as did the average daily yield of the herd, and the average butterfat content of the milk.

The Public Services during the year showed a slight decrease, which is attributed to the fact that early in the year the Jersey bull standing for public service died and has not yet been replaced.

The feed used during the year was slightly less than that used during the previous year. The Farm supplied feed to Grove Place during the year.

The mango crop was good and nearly 5,000 dozens were shipped through the Marketing Division of the Department.

Re-afforestation on the Liguanea Ridge was continued throughout the year and the Ridge is gradually becoming established in trees.

The quarters of the Estate Foreman were enlarged during the year and a litter carrier and manure shed were erected behind the main dairy building. The fence around the 100 stanchion building which was erected in 1933 was completed and trees were planted along the road leading to the Stock Farm Office.

The Stock Farm staged an exhibit of livestock and feeds at the Knutsford Park Show,

The number of people who visited the Farm was about the same as the previous year.

During the year the Stock Farm purchased the property known as Hope Pastures containing 120 acres which adjoins the Farm at the west side of Hope Estate.

J. W. Howe,
Farm Superintendent.

*Summafy of Report on Grove Place Stud Farm and Experiment Station.*

1. *Weather.*—A fair rainfall was recorded, there having been 126 rain days with a precipitation of 77.87 inches. We were very fortunate in not experiencing very high winds during the year.

2. *Experiment Station.*—The success achieved with Alfalfa and Clover, grown under garden conditions, was not maintained when pasture conditions were tried.

A vigilant campaign was instituted towards the control of the Fiddler Beetle, which has been very seriously affecting Citrus Trees in the parish. Several trees on the Station suffered from the attack of these beetles.

Further experiments in connection with the cultivation of Tobacco and Guatemala Grass were undertaken, and investigational work with leguminous crops for covers were continued.

A large number of the Coffee Trees in Section "A", suffered from exposure due to failure of shade. Banana is being used as temporary shade, and it is proposed to introduce Guango as an additional permanent shade.

3. *Livestock.*—A Dairy was established in connection with the Farm as a means of testing the production of the cows. Butter is made and disposed of to the Mental Hospital. All animals kept good health. Stud services for horsekind, cattle, sheep and pigs, were maintained and received fair patronage. The demand for young pigs is still in excess of our supply.

4. *Agricultural Education.*—Senior Students of the Farm School, attended for a course in Practical Agriculture, the course extending over a period of three terms.

Several demonstration days for Branches of the Jamaica Agricultural Society and other parties, were observed.

5. *Improvements to Buildings and Equipment.*—The new range of stables for the stallion and jack, was completed during the early part of the year.

A tank with a capacity of 85,000 gallons is being constructed.

L. Anglin Powell,
Acting Agricultural Superintendent.

*Summary of Senior Veterinary Officer's Annual Report for* 1937.

1. *Weather in* 1937.—The general weather conditions of the year are reviewed in relation to the livestock industry generally and the damage to roads, bridges, etc., and incidental loss of livestock from the flood rains in the northern and western areas of the Island in November and similarly in the north-eastern portion, Portland, in particular, are mentioned.

2. *Under Island Livestock Production and Markets* a review is given of:—

(i) *Horse and Mule Industry.*—The decline in horse and mule breeding and market prices incident to the advent and increasing use of motor cars and trucks for social and commercial transportation both on the public highways and on the plantations.

(ii) *Native Ass.*—The role and value of the ass to the peasant as a beast of burden and also draught in certain areas is set out; and the need for their improvement by better breeding and feeding is stressed.

(iii) *Cattle Industry.*—(a)Beef market:—Maintenance of average cattle production for the domestic beef trade and the tendency towards an increased supply as result of the gradual decline in the demand for planter's steers incident to increased motor traction and better public roads, and conversion of banana lands lost from the ravages of Panama Disease into grazing. Accordingly, there has been no scarcity of butcher stock, but an increase of the more inferior grades of cattle for slaughter with continuance of low prices and detrimental effect on the price of the best grades of beef cattle—a condition due mainly to the low-purchasing power of the greater portion of the population.

(b) Dairying:—Production of market milk was maintained and slightly increased, while butter production is declining.

(iv) *Sheep.*—The limited market and relatively high price for mutton is recorded and reference made to some of the factors which militate against the industry.

(v) *Goats and Pigs.*—It is observed that goats and pigs are reared under much the same methods by the peasants, and find ready sale for meat at the prices given.

(vi) *Poultry.*—These are kept extensively throughout the Island and poultry farming is being undertaken in the vicinity of Kingston and other towns. The industry has a big field for development by reason of the constant demand for fresh eggs and good table birds, but is handicapped especially, when undertaken in mass on farms, by serious flock diseases and depredation of thieves.

3. *Under Import and Export Trade in Relation to the Livestock Industry.*—The following matters are reviewed and compared in quantity and approximate value:—

(i) Imports of farm animal products.

(ii) Exports of same (mainly hides and skins) and domestic production of meats, milk, butter.

(iii) Imports and exports of livestock and baby chicks.

4. *Field Work on Animal Diseases* is treated under three main heads:—

(i) Notifiable infectious diseases under Law 29 of 1922 and the occurrence of (a) anthrax, (b) swine fever in 1937.

(ii) Other infectious diseases—their occurence, general distribution and outbreaks dealt with in 1937.

(iii) Miscellaneous non-infectious diseases, and work in tick control.

5. *Veterinary Services in Government Institutions* deals with services rendered and observations at:—

(a) Government Farm School, Hope and Stud Farm at Grove Place, Manchester, as set out in report on each station.

(b) Lunatic Asylum.

(c) Penitentiary (Prisons' Department).

(d) Public Works Department.

6. *Educational Work.*—(i) Regular teaching of Veterinary Science in Government Farm School.

(ii) Participation in 4th Annual Departmental Conference and Summer Course of Lectures in Agriculture.

(iii) Meetings of Central Board of Health, Bee Industry Committee of Jamaica Agricultural Society.

(iv) Letters and interviews with stockmen on veterinary and livestock matters.

7. *Statistics* cover:—

(i) Cattle slaughtered in island in 1937, with an estimate of sheep, goats and swine butchered annually.

(ii) Exports and Imports of Livestock including dogs.

(iii) Record of importations of baby chicks by aeroplane 1932-1937.

(iv) Registered Dipping Tanks in island, and sales of Paranaph and Arsenite of Soda for dipping fluid.

(v) Apiaries on register in Kingston and St. Andrew (foul brood affected zone) and in the other parishes with an estimate of number of apiarists and apiaries in the whole island.

8. *Stock Inspector's Work* (*June–December*, 1937) deals with his appointment and assigned duties with Grove Place as centre of operations.

(a) His general field observations as result of visiting pens and small settlers' districts are recorded in regard to:—

(i) Pastures.

(ii) Breeds and types of cattle in Manchester and their management by large owners and peasants.

(iii) Sheep—on the few places keeping them.

(iv) Goats—essentially a small settler's pursuit, their general suitability to their environment in Manchester and their value to the peasant.

(v) Pigs. A side-issue on the large properties but a valuable asset to the peasant. Improvement was noted of swine in districts visited, where owners had utilized the small stud of Berkshire pigs at Grove Place.

(b) Dairy Project at Grove Place.—The inauguration of a dairy herd by selection, training, handling and testing of cows from the Grove Place herd for milk yield under a system of grain feeding as a supplement to pasture.

(c) Veterinary assistance to small settlers and in the control of infectious diseases in particular.

(d) Educational work by lectures at Branch Meetings of Jamaica Agricultural Society and Dairymen's Association of Manchester.

Sgd. S. Lockett,
Senior Veterinary Officer.
March 18th, 1938.

*Summary of Report on Foul Brood Disease of Bees* 1937.

1. Maintenance of Governmental supervision was continued during the year, as the suppressive measures instituted from November 13th, 1934—official date of this third outbreak of American Foul Brood in the Island— and prosecuted rigorously in 1935 and 1936 have yielded good results.

2. Infection has remained confined to local parts of Kingston and Lower St. Andrew and has not been discovered or reported in other parishes of the Island.

3. A table of registered apiaries, owners and estimated number of colonies in Kingston and St. Andrew, is given with remarks.

4. The periodic tours of inspection of dangerous areas in Kingston and St. Andrew in 1937, is set forth with statement of findings.

5. A brief summary is given of the extent of infection in the affected area of Kingston and St. Andrew since 1934, the number of apiaries and colonies thereof falling to infection and the action taken in respect of them.

S. Lockett.

*Summary of the Agricultural Officer's Report.*

1. Due to special effort there are approximately 900 additional acres planted since 1933 and under regular care of the Department, probably 60 per cent. of which may be productive.

2. Most growers adhere to principles laid down by the Department with good results, most serious losses being manifest when a departure occurs.

3. In the third year small crops of shapely and palatable fruits have been reaped and some sold for export.

4. Success in St. Mary is encouraging and serious disease has not occurred despite the heavy rainfall and soil, due in part to planting on high mounds, to suitable artificial manuring and drainage.

5. Manchester and Clarendon are extending as plants allow, while St. Ann has not progressed as satisfactorily this year as previously.

6. In the West end advancement is slow though in some cases the growth of plants is sound.

7. Insect pests are generally controlled, the Fiddler Bug having caused less difficulty than before. The new methods of attack introduced by the Entomologist have been tried, but possibly not in the best way and better success is anticipated in the next year's plans.

8. Interplanting has been very successful and in some cases actually profitable. It invariably improves the soil culture. The cooperative tenant system is useful if controlled.

9. Demonstration Plots in St. Mary are useful, in Portland washed by streams are somewhat neglected, in St. Thomas good also, though somewhat affected by bananas.

10. The Citrus Development Loan Scheme is still appreciated but lack of plants is a deterrent to progress. Only 2,703 nursery plants were issued during the year

11. Attended five meetings for the year including the Staff Conference and Summer Course.

12. Agricultural Officer also inspected lands for Land Settlement and reported on Rice culture.

L. L. Carrington.

*Summary of Report of the Tobacco Specialist.*

1. *Registered Growers* 1936.—All tobacco produced by the registered growers was delivered to the new Government Tobacco Station by the end of July, totalling 55,722 lbs. net weight. An average of 50 women were employed daily at the Station from the beginning of March to the middle of October stapling, grading and measuring the tobacco. In all 177 cases weighing 49,146 lbs. net weight of tobacco were shipped to the United Kingdom. The best tobacco was produced in Clarendon.

2. *Experimental Plots.*—Three plots of 2 acres each were again used this year for experimental purposes, though the Cherry Garden plot was abandoned for a better plot at Constant Spring. Some experiments were tried with Virginia type plants, and what has been flue-cured to date has turned out fairly good.

Manurial tests were made, the results of which have not yet been determined. Many packets of seed and over 100,000 suckers were distributed, so that the growers would be able to collect sufficient good seed for use next year. The Havana type of seed was mostly collected, as this type of tobacco is understood by the local growers.

3. *Registered Growers,* 1937.—For the 1937 season, 37 growers were registered and were given loans, with which they could clear their lands and build tobacco barns. 250 acres of good lands were planted out this year, and if the rainfall is good, a large crop should result. Many growers had difficulty in producing good suckers this year.

4. *Independent Growers and Exporters.*—Twenty independent growers sent in their tobacco for curing grading and shipping, and four exporters sent their tobacco to the Tobacco Station for examination, which was made necessary through the new Tobacco Regulations. The exporters have already improved their methods of grading and packing, though the moisture content is not yet as it should be. The Home market requires no more than 12 to 14 per cent. moisture content.

5. *Government Tobacco Station.*—Plans were approved for further extensions, and in November another building was begun capable of holding 150,000 lbs. of tobacco. Existing buildings were improved and made more airy. The average price obtained from the sales to date shows that the growers will be paid about 8d. a lb. for their tobacco. To make better prices more of the thin binder leaf must be produced.

6. *Miscellaneous.*—Correspondence during the year was considerable, and two more circulars were published in the Agricultural Journal, bringing the total up to five and so completing the series. A great deal of travelling was necessary, as new planters had to be advised and the registered growers had to be visited regularly.

J. W. Winckley,
Tobacco Specialist.

*Summary of Annual Report of the Chief Inspector of Produce.*

1. *The Produce Law, Additions to its Schedules.*—Regulations covering Vegetables, fruits, grapefruit and oranges passed. Limes and tangerines to be added.

2. *Revenue from Licences under the Produce Law.*—Drop in Revenue.

3. *Produce under Classes* 1 *and* 2 (*Bananas, Citrus, etc.*).

*Bananas.*—Quantity and quality shipped. Value of Inspectors' work. Arbitration.

*Citrus.*—Quantity shipped. Freight rates, markets, New Zealand shipments.

*Pimento, Cocoa, Coffee, Annatto and Ginger.*—Curing, grading and packing.

4. *Court Cases and Destruction of Produce.*—Number of cases tried. Quantities of produce destroyed, econditioned or allowed for local use only.

5. *The Produce Board.*—Number of meetings. New Zealand quotas. Personel of Board.

6. *The Staff.*—Personel, Acting Appointments. Leave.

P. W. Murray,
Chief Inspector of Produce.

*Summary of Report of the Deputy Island Chemist.*

The total number of samples analysed in The Government Laboratory for the year ended 31st December, 1937, was derived as shown in the following Table:—

| | | | |
|---|---|---|---|
| Number of samples analysed for:— | | | |
| (i) Police and Judicial Departments | | 3,113 | 63 per cent. |
| (ii) Customs and Excise Department | | 391 | 8 " |
| (iii) Department of Science and Agriculture | | 33 | |
| (iv) Medical Department | | 27 | |
| (v) Department of Public Works | | 86 | |
| (vi) Jamaica Agricultural Society | | 70 | 4 " |
| (vii) Kingston and St. Andrew Corporation | | 4 | |
| (viii) Water and Sewerage Commission | | 2 | |
| Total Official Samples | | 3,726 | |
| Government Stock Farm (milks) | | 945 | 20 " |
| General Samples: | | | |
| Cattle Dipping Fluids | 60 | | |
| Sugars | 32 | | |
| Rums | 109 | | |
| Miscellaneous | 69 | 270 | 5 " |
| Grand Total | | 4,941 | 100 " |

The number of Official Exhibits analysed under various headings and laws were as follows:—

| | |
|---|---|
| (i) *Police and Judicial Departments*— | |
| Human Viscera and Organs | 121 |
| Stomach Washings and Vomits | 9 |
| Animal Viscera | 3 |
| Substances suspected to contain poison | 98 |
| Exhibits in Murder cases | 62 |
| Do. Arson cases | 71 |
| Do. Obeah cases | 16 |
| Do. Housebreaking and Larceny cases | 11 |
| Under the following Laws— | |
| Food and Drugs Law— | |
| Castor Oils | 1 |
| Medical Laws— | |
| Medicines, Herbs, etc. | 14 |
| Dangerous Drugs Law— | |
| Opiums, Ganga, and various exhibits | 1,914 |
| Coining Laws— | |
| Counterfeit Coins and Coining exhibits | 691 |
| Spirit License Law— | |
| Rums, Whisky, etc. | 82 |
| Brewers License Law— | |
| Liquids for alcoholic strength | 11 |
| Protection of Birds and Fishes Law— | |
| Fish and vegetable barks | 3 |
| Miscellaneous exhibits | 9 |
| | 3,113 |
| (II) *Customs and Excise Department*— | |
| Denatured Alcohols and Denaturants | 32 |
| Native Wines | 21 |
| Rums and Rum Punches | 94 |
| Flavouring Extracts and Essences | 20 |
| Fuel Oils and Gasoline | 68 |
| Insecticides, Disinfectants, etc. | 18 |
| Fabrics, Silks, Cottons, etc. | 121 |
| Miscellaneous | 17 |
| | 391 |
| (III) *Department of Science and Agriculture*— | |
| Animal Viscera | 2 |
| Suspected "Horse Dopes" | 5 |
| Concentrated Cattle Dips 2, Insecticides 2, | 4 |
| Waters, Potable and Distilled | 2 |
| Distillery Products | 6 |
| Plant Specimens 1, Food Products 7 | 8 |
| Miscellaneous, Instruments, Chemicals, etc. | 6 |
| | 33 |

| | |
|---|---|
| (IV) *Medical Department*— | |
| Fresh Milks, Genuine | 5 |
| Do. Adulterated | 5 |
| Waters, Potable 11, Distilled 1 | 12 |
| Food Products | 4 |
| Miscellaneous | 1 |
| | 27 |
| (V) *Department of Public Works*— | |
| Native Corns | 85 |
| Diesel Engine Fuses | 1 |
| | 86 |
| (VI) *Jamaica Agricultural Society*— | |
| Cassava tubers | 70 |
| (VII) *Kingston and St. Andrew Corporation*— | |
| Waters, Potable 2, Coal Tars 1, Gas Coals 1 | 4 |
| (VIII) *Water and Sewerage Commission*— | |
| Waters, Potable | 2 |
| Amount collected for Laboratory Fees | £180 2 1 |
| Amount collected for Laboratory Sales | £1,209 13 1 |
| Laboratory Staff—: | |
| Deputy Island Chemist | 1 |
| Assistant to Deputy Island Chemist | 1 |
| Technical Assistants | 4 |
| Clerk and Storekeeper | 1 |
| Storeman and Boiler Attendant | 1 |
| Messengers, male 1, female 1 | 2 |
| Total | 10 |

Fees amounting to £180 2s. 1d. were paid in respect of 207 General Samples submitted by the public, and as these only represent 5 per cent. of the work, on a sample basis, done by the Laboratory, it is evident that 95 per cent. of the work was done free for Government Departments.

The 121 analyses of human viscera and organs were undertaken in connection with 71 deaths, positive results being obtained in 40 cases. These figures include three cases of adult male, and one case of adult female suicide, and two cases of accidental poisoning by Cattle Dip, and represent a decrease of 66 from the previous year.

11 cases investigated for poison revealed the presence of Hydrocyanic Acid, all of which were probably derived from the consumption of Bitter Cassava.

Exhibits in murder cases, 62, show an increase of 16 over last year.

Increases in the number of exhibits under The Dangerous Drugs Law, Opiums, Ganga, etc., are recorded, being 1,914 as against 656 for last year, an increase of 1,258.

Decreases are recorded in the number of exhibits under the Coining Laws, and in connection with cases of Arson and "Obeah."

Exhibits examined under the Medical Laws and the Spirit License Law remain about the same as last year.

Analyses and examinations for the Customs and Excise Department show a decrease of 66 from last year. The principal articles analysed were Fabrics, Silks, etc., for classification under the Tariff Laws, Native Wines, Rum Punches, etc., for alcoholic content for refund of Duty, and Flavouring Extracts and Essences for prohibited constitutents, and alcoholic strength for assessment of duty.

During the year the importation of Ethyl and Methyl Alcohols was prohibited, except under special permit, and new regulations governing the denaturing of alcohol for power and industrial purposes brought into force with a view to safeguarding the Revenue.

Various specimens, etc., numbering 33 were analysed for Officers of the Department of Science and Agriculture in connection with their respective investigations and reports rendered to them.

50 per cent. of the Fresh Milks submitted by the Medical Department were found to be adulterated with added water ranging from 12 to 30 per cent. A specimen of Sardines was found to contain 0.875 grains of Tin per lb.

70 lots of Cassava tubers grown under varying conditions were analysed for the Jamaica Agricultural Society with a view to determining the most favourable conditions of starch production. The tests are being continued and will form a separate report in due course.

Weekly analyses of Fresh Milks supplied by the Government Stock Farm to the various Public Institutions were carried out throughout the year and point to a high standard of quality being maintained.

The usual analyses of Cattle Dipping Fluids, Sugars, Rums, Waters, etc., were carried out on behalf of the public.

The manufacture of Paranaph, Fly Killer, etc., was carried out throughout the year, and the public kept supplied with various commodities for the charging of Cattle Dipping Tanks, which now number 385, throughout the Colony.

In addition to the above various Standard Solutions, etc., were supplied to Sugar and Rum Manufacturers, and various Public Utility Companies for testing purposes during the year. This work calls for much time and Laboratory Sales show an increase of £214 13s. 1d. over last year, being £1,209 13s. 1d. as against £995 0s. 0d.

W. L. Barnett, M.A., B.Sc., F.I.C.,
Deputy Island Chemist,
19.2.1938.

*Summary of the Report of the Government Entomologist.*

Insect pests which have come under observation have been recorded under the crops or materials attacked.

A survey covering the whole island has been undertaken to ascertain the economic importance of the various species of 'white grubs' which attack sugar cane in Jamaica and statistical data with regard to the degree of infestation by the Moth Borer of the various varieties of sugar cane grown in the Experiment Station at Hope have been recorded.

Banana has not suffered to a noticeable extent from insect pests. Predators to combat the Weevil Borer have been imported from Fiji and from the Federated Malay States.

By judicious spraying scale insects affecting citrus have been effectively kept under control and rejections of fruits at the packing houses has consequently been greatly reduced. Field experiments conducted over extensive areas have shown that the Citrus Root Girdler *Prepodes vittatus* can be economically and effectively kept under control.

Pests attacking tobacco, coconut, truck crops and ornamental plants are enumerated.

Considerable attention has been given to the problem created by termites infesting buildings. A progress report on a survey conducted in the urban areas of Kingston and St. Andrew has been published. The economic importance of the species concerned have been recorded and the reasons which have led to their increase studied.

The state of affairs in public buildings and suggestions made to reduce the heavy losses incurred by Government and by the public through damage occasioned by those insects are mentioned.

The teaching of applied entomology has been pursued by means of regular contributions to the Journal of the Jamaica Agricultural Society and by lectures delivered at meetings of agriculturists. Collections of exhibits of insects of economic importance have been extended and a Text Book of Applied Entomology for the use of the students of the Hope Farm School is in preparation.

Beneficial insects which have been introduced to control agricultural pests have been : the Histerid *Plaesius javanus*, Er. from Fiji and the Hydrophilids *Dactylosternum hydrophiloides*, McL. and *D. abdominale*, L. from the Federated Malay States to control the Weevil Borer of Banana, *Cosmopolites sordidus*, Germ. The parasitic wasp *Dasyscapus parvipennis*, Gahan from Trinidad to control the thrip, *Selenothrips rubrocinctus* which attacks mango, cacao and other plants of economic importance. The Coccinellid, *Cryptognatha nodiceps* from Trinidad to control the coconut scale *Aspidiotus destructor*, sign in the Cayman Islands.

Work done in the Botanical Division whilst the Botanist was on leave comprised the raising of seedlings bananas, the recording and planting of seeds sent in from the breeding plots. So as not to divide records, and to avoid repetition, data about all such work have been left for the Botanist to include in his report.

W. L. B.

*Summary of Report of the Agricultural Chemist.*

Soil Investigations.

1. *Lower Clarendon Soil Survey.*—The soil survey of the lower Clarendon Plain was completed during the year, and a full report with maps prepared. The survey, while providing information on the immediate problem of irrigation, has also provided detailed information on the soils which occur in the area and which appear to occupy a considerable proportion of the southern central plain of Jamaica.

2. *Soils of Spanish Honduras and Guatemala.*—A number of soils obtained during a visit to Central America were examined in the Laboratory.

3. *General Soil Investigations.*—Soil investigations covered all types of crops but particularly bananas. The nutrient requirements of a banana soil are indicated.

General Agricultural Analyses.

4. The samples submitted for analysis are classified. In importance of determination the salt content of water which is intended for irrigation is stressed.

Sugar Cane.

5. *Cane Yield Survey.*—A brief summary of the information obtained in the 1936-37 Cane Yield Survey is given. Detailed information has been published in a Departmental Bulletin.

*Sugar Factory Returns.*—Weekly reports on sugar factory returns have been circulated.

*Wood Consumption by Factories.*—Data with the consumption of wood by factories has been collected.

*Yields of Sugar per Acre.*—Data collected on the subject of the yield of sugar per acre indicate that the determining factor is the yield of cane per acre.

*Sugar Crop Season.*—Graphs indicating the optimum period of the cropping season during 1937 were prepared.

*Field Experiments.*—Attention has been directed largely toward variety rather than manurial experiments as the total number of experiments which can be operated is limited. Results of variety experiments have been communicated to planters. Results of manurial experiments have been published.

Bananas.

6. The Departmental field experiments have been continued and a large proportion of the crop has been reaped. The experiments are providing valuable information with regard to the effect of various nutrients on the banana plant. In particular the balance between available phosphate and potash in the soil appear to be an important factor in leaf development, and consequently on production. A survey of the observations made is included.

Other experiments have indicated that profitable increases in yields can be obtained by the use of artificial manures.

A record of Panama Disease spread in this area indicates the importance of contact cases in the spread of the disease.

### Corn.

7. Imported varieties of corn used in a variety experiment did not grow satisfactorily.

### Coconuts.

8. Minor trials of the effect of artificial manures on the incidence of wilt disease gave inconclusive results.

H. H. Croucher,
Agricultural Chemist.

*Summary of Report of the Government Botanist.*

The Botanist was absent on leave from November 24th to the end of the year, during which time various aspects of Banana Breeding work were discussed with authorities abroad. Visits to Trinidad and Central America were also made.

An increasing number of enquiries of a botanical nature have been dealt with.

### Banana Breeding.

Weather during the year proved favourable for this work, losses of pollinated stems from wind were few. The year has been one of steady expansion. 3,132 stems were pollinated, an increase of 38.6% over the previous year. The seed yield was 1,686, an increase of 115%, and the 929 germinations 124% more than those of 1936. Three new breeding plots came into operation and the work on them and on the old plots is briefly reviewed.

Crosses carried out in previous years have been continued with minor modifications and breeding with the two new wild species, *Calcutta* 4 and *Samoa* has been commenced. The cross, *Highgate* x *M. acuminata* continues to produce improved seedlings; the backcross of the F1 to Gros Michel is unsatisfactory. F2 families have been considerably increased.

Two new wild *Musæ, Annam* and *Pisan Lilan* have been received from Trinidad and will be used for breeding next year. Eleven other wild types were obtained from Honduras and are under observation.

### Seedlings.

169 new seedlings have been planted in the field and 295 remain to be planted out. Many of the seedlings have now shot and a better estimate of their possible economic value can now be made. Fourteen seedlings have been selected for extended trial and their characteristics are summarised. Seedling nursery plots have been extended as also have those plots in which seedlings are being tested for resistance to disease. Seventy-four seedlings are now undergoing this test and so far only two have proved susceptible to the disease. Extension of the S.19 plantings to provide fruit for cold storage experiments have shot and on one of the new plots good fruit has been obtained. The *Giant Governor* variety has been bulked to $\frac{3}{4}$ acre and planted to supply fruit for cold storage tests. The reserve of *Cavendish* suckers is being maintained.

### Papaw.

Tests of nine species and varieties for resistance to mosaic disease have been completed. Two species have proved resistant and have been crossed with commercial varieties of *Carica papaya*; little seed was set.

### Plant Pathology.

A resumé of the activities of the Division whilst the Botanist was acting as Plant Pathologist is given. The bulk of the work consisted of advice and experimentation on the control of Banana Leaf Spot (*Cercospora Musae*), this is detailed. Other enquiries dealt with are listed.

L. N. H. Larter,
Government Botanist.

## SECTION II.—WORK OF THE DEPARTMENT OF AGRICULTURE.

### A. Public Gardens.

#### (i) *Report of the Superintendent and the Horticulturist.*

#### 1. Hope Gardens.

*Weather.*—The rainfall for the year, which was 49.19 inches, was below the average for the past 56 years. The rainfall was fairly well distributed through the year and no damage was done by flood rains.

*Seedling Orchids.*—During the years 1930-1932 a large number of hybrid orchid seedlings was raised by the asymbiotic method by the Microbiologist. When the seedlings had reached a stage of growth where they could be safely removed from the glass incubators into a compost of fibrous peat they were handed over to the care of the Horticulturist. After a period of six years of constant attention to their culture a number of the early crosses flowered during the year under review and produced some beautiful results.

The most successful crosses from a floral viewpoint are No. 16 and No. 20. No. 16 was obtained by crossing Cattleya Dowiana with an excellent free-flowering Cattleya Hardyana var. regalis. The qualities of C. Hardyana are clearly shown among the batch of seedlings raised from this cross. A number of them have white sepals and petals, large dark purple lip with golden veins over the surface of the throat. Some of the plants produced four blooms to the spike. No. 20, Lc. lustrissima x C. Maggie Raphael alba, has also produced a number of choice hybrids showing the qualities of an extra fine variety of Lc. lustrissima, together with the vigour of C. Maggie Raphael alba. Cross No. 112, Vanda Sanderiana x Vanda coerulea, was made in 1932 and has produced some pleasing varieties of this comparatively rare hybrid. The flowers were of good quality, showing the delicate colouring of the blue Vanda and the prominent venations of Vanda Sanderiana on the fairly large petals.

The following recorded crosses flowered during the year:

No. 15—C. Dowiana x C. Gaskelliana
No. 16—C. Dowiana x C. Hardyana var. regalis
No. 18—C. Miss Williams x Bc. Pallas
No. 20—Lc. lustrissima x C. Maggie Raphael alba
No. 27—C. labiata x Bc. Mrs. J. Leeman
No. 38—C. labiata x Lc. Mrs. Chas. Medo
No. 39—C. Labiata x C. Marriottiana
No. 50—C. Dowiana x C. gigas
No. 53—C. Mossia x Lc. dominiana
No. 112. Vanda coerulea x Vanda Sanderiana.

A number of other crosses are showing signs of flowering in the coming year. The orchid collection, which comprises a wide variety of species and hybrids of garden origin, maintained a continuous show of blooms in the orchid house throughout the year.

*Rose Garden.*—The Rose Garden was cleared of the old stock of plants and the site remodelled to accommodate approximately 2,500 plants in twenty beds all 12 ft. wide and varying in length from 60 ft. to 40 ft., with a grass pathway of eight feet between each bed. The beds were double trenched to a depth of 18 inches and a large quantity of manure used in the preparation of the soil. The Rose Garden is situated near a concrete irrigation gutter by which means each bed can be watered expeditiously and with the minimum amount of attention. Liquid manure from the cow stalls also passes along this irrigation gutter and is available for watering the plants at regular intervals.

The varieties of roses grown at Hope are those that are considered the most free-flowering in the lowlands, viz:—

Pink Maman Cochet
White Maman Cochet
Helen Good
Jonkeer J. L. Mock
President Taft
Radiance
Red Radiance
Laurent Carl
Marie Van Houtte.

*Flower Beds and Borders.*—To commemorate the coronation of Their Majesties King George VI and Queen Elizabeth a design in the form of a crown and the letters G. VI. E was laid out on a section of the lawn adjoining the Rose Garden. The crown and letters were planted with varieties of bright coloured coleus. The sections of the crown were clearly defined by the use of selected varieties which were constantly checked in their growth so as to form a compact growth. A pleasing carpet-bedding effect was obtained and the design was a feature of interest in the Gardens from May to December.

Some pleasing floral features were seen in the flower beds around the Band Stand, and the beds along the main drive during the early months of the year, and again during the months of July, August and September.

A border of Ruby Bougainvillea was planted along the boundary fence to the west of the Band Stand. Plants of *Jacobinia coccinea*, a species which is now naturalised in the Castleton district, have been planted in a bed along the Central Walk.

*Central Drive.*—The surface of this driveway was in a very bad condition for vehicular traffic and as there were no financial means at our disposal to macadamise the road it was decided to close the drive to vehicular traffic and to maintain it for pedestrians only. By closing the drive it was possible with the help of the Gardens labour to lay down a good surface with the Number One material from the Public Works

stone crushing plant at Papine. This material has been used on the Gardens paths with very good results, forming an even walking surface. Forty-seven truck loads of this material were used in surfacing the drive which is 24 chains in length. The middle of the road was raised six inches above the water table to ensure rapid drainage during the heavy rains, and with the constant use of a heavy roller a very satisfactory surface is being maintained.

*Cactus Garden.*—A general overhauling of the Cactus Garden was undertaken in conjunction with the re-surfacing of the Central Avenue which passes through the Cactus Garden.

*Main Avenue.*—The Mango Orchard on the west side of the main drive has been enclosed to provide extra pasturage for the Stock Farm cattle. A wire fence with concrete posts encloses the side of the orchard running parallel with the drive. This fence was erected by the Stock Farm. Plants of the Ruby Bougainvillea are planted at regular distances along this fence. A definite improvement in the appearance of the grounds from a pastoral viewpoint has taken place since the cattle were turned into it.

*Labelling of Trees.*—Further progress was made in labelling the plants in the Gardens. The labels are made of native cedar (*Cedrela odorata*) and they are used as a foundation for attaching the metal strips on which the names are stamped. We have been facilitated in this work by the co-operation of the Head Master of the Government Farm School in allowing the students to make the labels during their carpentry classes.

*Coronation Avenue.*—An avenue of Talipot Palms (*Corypha umbraculifera*) was planted to commemorate the Coronation of Their Majesties King George VI and Queen Elizabeth. The palms are planted at regular distances on the Hope Lands on the north and south sides of the main road between the Government Laboratory Buildings and the main entrance gate to Hope Gardens. Twenty-two holes six feet square were prepared with rich soil to accommodate the palms. The Hon. A. C. Barnes, C.M.G., Director of Agriculture, planted one of the palms forming the avenue on Coronation Day. A Royal Palm (*Oreodoxa regia*) was also planted by the Director of Agriculture near the Head Office building on that occasion.

*Talipot Palms.*—Seeds of the two Talipot Palms (*Corypha umbraculifera*) which flowered last year were distributed to various Departments of Agriculture and Nurseries abroad. There are four other plants of the Talipot Palm sending up their flower spikes.

*Band Concerts.*—Regular concerts were arranged by the Jamaica Military Band on the first and third Sundays of each month. These concerts have been well received and it has been further noticed that the numbers of visitors to the Gardens have increased considerably during the week-ends as a result of these Sunday afternoon concerts.

The Band of the Royal Marines of H.M.S. Apollo played in the Hope Gardens by kind permission of Captain deMeric, M.V.O., on May 11th.

The band of the U.S.S. Omaha played in Hope Gardens by kind permission of Rear-Admiral Williams on June 13th.

*Floral Exhibitions.*—The Public Gardens staged a non-competitive group of cut flowers at the Jamaica Horticultural Society's Flower Show which was held at the Mico Training College on April 7th, 1937.

A non-competitive exhibit of cut flowers was also staged at the Liguanea Agricultural Show (Horticultural Division) held at Knutsford Park on the 24th February, 1937.

*Introduction of Plants.*—Mr. J. E. Higgins, Consultant in Plant Introduction in charge of the Canal Zone Experiment Gardens, visited Jamaica during the year, and an exchange of ornamental plants was made between the two Departments.

*Soil Sterilizer.*—An iron cauldron set in a stone structure was brought into use in the Nursery for sterilizing soil for seedlings. The results obtained from the seedlings grown in the sterilized soil have been most satisfactory, and the loss from damping-off has been greatly reduced.

*Buildings.*—A Tourist Rest was erected in Hope Gardens near the Band Stand with funds provided by the Tourist Trade Development Board.

*Palisadoes.*—Thirteen coconut plants were set out around the Square at Port Royal and are doing well. The Superintendent of Public Gardens was appointed a member of a committee to select bathing sites along the Palisadoes Road and to recommend suitable buildings.

*Botanical Specimens.*—During the year a large number of botanical specimens was supplied for the Cambridge Local Examinations, Junior and School Certificate, and also the University of London Matriculation Examinations.

*Visitors.*—A large number of distinguished visitors from abroad visited the Gardens during the year.

*Special Visits.*—A visit was made to Montego Bay with reference to beautifying the approach to the town and planting trees and shrubs along the streets.

Fern Gully was visited with reference to its upkeep.

Visits were made to Blue Hole, Portland, and recommendations made for opening up and beautifying the surroundings.

A visit was made to Bamboo Walk, Holland Estate, St. Elizabeth, and suggestions made to the Public Works Department for the improvement of the drive.

Visits were made to supervise the laying out and planting of the grounds around the new buildings of the Tobacco Grading Station, which is situated along the Spanish Town Road.

This Department received a request from the Salvation Army Authorities to advise on the laying out and planting of the grounds around the new buildings for the School for the Blind. This request was fulfilled.

Advice was given on the work of laying out the grounds inside the ruins of the Old King's House at Spanish Town. This work was not completed as other plans were introduced by Government for the preservation of the ruins.

Suggestions were given for the laying-out of the grounds around the new operating theatre at the Public Hospital, Kingston.

The Government requested the inspection of the work undertaken by the Pomeroy Nurseries in the Constant Spring Hotel grounds in accordance with a contract drawn up between the Government and that Nursery for the beautifying of the grounds.

*Correspondence.*—During the year 2,055 letters were received in this Office and 1,029 letters were sent out, not including stereotyped circulars which are sent in reply to letters in connection with the purchase of plants, and interdepartmental minutes.

*Lectures, etc.*—At the Agricultural Short Course for Agricultural Instructors the Superintendent gave a lecture on his observations on cultivation and cane growing in Puerto Rico.

The Horticulturist gave a demonstration on the propagation of plants.

*Meetings.*—The following meetings were attended by the Superintendent of Public Gardens:

January: Meeting at the Public Works Office in connection with work to be carried out on the Palisadoes Road during the year.

Meeting of the Sugar Manufacturers' Association.

February: Attended Staff Conference.

April: Attended meeting of Executive Committee of the Jamaica Association of Sugar Technologists.

June: Attended meeting in connection with the Summer Course of Lectures.

July: Attended the Summer Course of lectures.

December: Attended Conference of the Jamaica Association of Sugar Technologists.

The following meetings were attended by the Horticulturist:—

February: Attended Staff Conference.

July: Attended Summer Course of Lectures.

*Routine Work.*—The routine work of the maintenance of the Gardens and the propagation and distribution of nursery stock was regularly attended to.

PLANTS DISTRIBUTED FROM HOPE GARDENS, 1937.

*Sold.*

| | |
|---|---|
| Economic Plants— | |
| Coffee | 11,700 |
| Cacao | 150 |
| Citrus, seedlings | 5,925 |
| Citrus, budded plants | 202 |
| Mango, grafted plants | 191 |
| Miscellaneous | 1,485 |
| | 19,653 |
| Ornamental Plants | 13,844 |
| | 33,497 |

*Free Grants.*

| | |
|---|---|
| Economic Plants— | |
| Coffee | 3,650 |
| Budded citrus | 400 |
| Cane Tops and cuttings | 166,740 |
| Timber Trees | 3,842 |
| Guatemala Grass cuttings | 21,461 |
| | 196,093 |
| Ornamental Plants | 1,981 |
| | 198,074 |
| Total number of Economic Plants | 215,746 |
| Total number of Ornamental Plants | 15,825 |
| Total number of Plants distributed | 231,571 |

The following statement shows the distribution of plants for the past five years from the Nursery at Hope:—

| | 1937. | 1936. | 1935. | 1934. | 1933. | Total. |
|---|---|---|---|---|---|---|
| Coffee | 15,350 | 11,991 | 19,192 | 12,116 | 8,656 | 67,305 |
| Cacao | 150 | 50 | .. | .. | .. | 200 |
| Citrus seedlings | 5,925 | 9,800 | 4,177 | 1,603 | 6,358 | 27,863 |
| Citrus , budded plants | 602 | 301 | 282 | 1,256 | 859 | 3,300 |
| Mango, grafted plants | 191 | 656 | 336 | 975 | 1,520 | 3,678 |
| Cane Tops and cuttings | 166,740 | 139,228 | 141,880 | 163,785 | 226,864 | 838,497 |
| Elephant Grass cuttings | .. | .. | .. | 600 | 500 | 1,100 |
| Guatemala Grass cuttings | 21,461 | .. | .. | .. | .. | 21,461 |
| Timber seedlings | 3,842 | 11,957 | 9,605 | 3,341 | 16,102 | 44,847 |
| Miscellaneous Fruit and Economic Plants | 1,485 | 2,153 | 2,378 | 3,239 | 12,187 | 21,442 |
| Ornamental Plants | 15,825 | 22,157 | 27,693 | 26,867 | 15,425 | 107,967 |
| | 231,571 | 198,293 | 205,543 | 213,782 | 288,471 | 1,137,660 |

## 2. Castleton Gardens.

*Weather.*—The rainfall for the year was 180.53 inches. This is above the average for these Gardens. During November there was a deposit of 38.60 inches which damaged the pathways through the Gardens and gravel had to be headed from the river to re-surface them.

*Shrubberies.*—One of the shrubberies in the lower garden was cleared of miscellaneous shrubs to provide space for laying out a number of beds to accommodate a collection of Ixoras. This practice of grouping a collection of kindred varieties opens up the possibilities of broadening the landscape within the Gardens in place of the present somewhat congested lay-out of the shrubberies.

*New Introductions.*—Plants of *Warszewiczia coccinea* and *Synsepalum dulcificum* (Miraculous Fruit) were received from the Canal Zone Experiment Gardens and planted in the arboretum.

*Routine.*—The general routine work of billing lawns, clearing flood drains, repairing pathways, pruning, forking, weeding shrubberies, and propagating plants for nursery sale was regularly attended to.

### Plants Distributed from Castleton Gardens, 1937.

*Sold.*

| | |
|---|---|
| Economic plants .. .. .. | 112 |
| Ornamental Plants .. .. .. | 582 |
| | 694 |

*Transferred to Hope.*

| | |
|---|---|
| Economic Plants .. .. .. | 1,177 |
| Ornamental Plants .. .. .. | 7,061 |
| | 8,238 |
| Total number Economic Plants .. .. | 1,289 |
| Total number Ornamental Plants .. .. | 7,643 |
| | 8,932 |

## 3. Public Gardens, Kingston.

*Erection of Iron Gate.*.—An iron gate was erected at the entrance to the enclosure where the Foreman's Office and Tool Shed is situated.

*Transfer.*—On December 22nd Foreman Clough was transferred to King's House Gardens.

*Routine Work.*—The general routine work of maintaining the Victoria Park, the lawns around the Public Buildings, the Memorial Square, and Headquarters' House Garden was regularly attended to.

## 4. Hill Gardens, Cinchona.

No new work was undertaken in these Gardens during the year. The Foreman in charge maintained the Gardens in a satisfactory condition.

## 5. King's House Gardens and Grounds.

*Tennis Courts.*—The new tennis court was levelled and resurfaced and is now in good condition. The two existing courts were also re-surfaced.

*Improvements.*—The lawn to the east of the Dining Hall was dug up, levelled and planted in Bahama grass.

A rockery was built around the old unsightly Guinep tree stump and planted with ferns and other plants.

Two beds to the north and south of the Sunk Garden were dug out two feet deep and refilled with manure and good soil, and planted in Red Salvia.

*Kitchen Garden.*—The kitchen garden was extended eastwards of the present garden. An assortment of fresh vegetables was grown to supply the domestic requirements of King's House.

*Transfer.*—Foreman Robinson was transferred to Parade Gardens on December 22nd.

*Floral Decorations.*—Decorations were carried out for a number of official functions by the Gardens Staff.

Lady Denham sent an exhibit of Zinnias to the Manchester Horticultural Show held at Mandeville on May 24th.

*Routine.*—The general routine work of billing and mowing lawns, repairing pathways, forking and weeding shrubberies, renewing and making flower beds and propagating plants was regularly attended to.

## 6. Gordon Town.

The small garden at Gordon Town was maintained in a tidy condition out of the Hope Gardens Maintenance Vote.

### 7. Bath Gardens and Nursery (St. Thomas).

Mr. Glen Campbell, Inspector of Plant Diseases, is in charge of this garden and nursery.

The Superintendent of Public Gardens and the Horticulturist visited the garden and gave advice on the improvement of the lay-out.

*Coffee Nursery.*—The coffee nursery has been maintained.

*Routine.*—The routine work of mowing lawns, remodelling beds, weeding and forking shrubberies was regularly attended to.

Summary of Plants Distributed by the Department during the last Five Years.

| | 1937. | 1936. | 1935. | 1934. | 1933. | Total. |
|---|---|---|---|---|---|---|
| Coffee .. .. | 15,350 | 11,991 | 19,192 | 12,116 | 10,356 | 69,005 |
| Cacao .. | 150 | 50 | .. | .. | .. | 200 |
| Citrus seedling .. | 5,925 | 9,900 | 4,177 | 1,603 | 6,358 | 27,963 |
| Citrus, budded plants .. | 602 | 301 | 282 | 1,256 | 859 | 3,300 |
| Mango, grafted plants .. | 191 | 656 | 336 | 975 | 1,520 | 3,678 |
| Cane Tops and Cuttings | 166,740 | 139,228 | 141,880 | 163,785 | 226,864 | 838,497 |
| Elephant Grass cuttings | .. | .. | .. | 600 | 500 | 1,100 |
| Guatemala grass cuttings | 21,461 | .. | .. | .. | .. | 21,461 |
| Timber Trees .. | 3,842 | 11,957 | 9,605 | 3,341 | 16,102 | 44,847 |
| Miscellaneous Fruit and Economic plants .. | 1,597 | 2,196 | 2,414 | 3,429 | 14,147 | 23,783 |
| Ornamental Plants .. | 16,407 | 22,653 | 28,094 | 26,867 | 22,746 | 116,767 |
| | 232,265 | 198,932 | 205,980 | 213,972 | 299,452 | 1,150,601 |

9. The Plantation and Garden Sales for the last five years have been as follows:—

| | |
|---|---|
| 1937 .. .. | £325 0 9 |
| 1936 .. .. .. | 387 7 11 |
| 1935 .. .. | 375 4 8 |
| 1934 .. .. | 509 13 1 |
| 1933 .. .. | 550 8 6 |

10. The rainfall at the various gardens for the year under review is as follows:—

| | Hope Gardens. | Castleton Gardens. | King's House Gardens. | Public Gardens, Kingston. | Hill Gardens, Cinchona. |
|---|---|---|---|---|---|
| January | 1.30 | 16.86 | .57 | 1.39 | 4.92 |
| February | .52 | 2.91 | .50 | .18 | 3.10 |
| March .. | 1.08 | 2.14 | .51 | .04 | 1.37 |
| April .. | 1.29 | 5.68 | .74 | .60 | 4.46 |
| May .. | 10.22 | 26.42 | 8.34 | 6.27 | 14.67 |
| June .. | 1.70 | 14.37 | 1.23 | .68 | 1.84 |
| July .. | 1.71 | 7.40 | 1.05 | .32 | 4.65 |
| August .. | 6.47 | 14.12 | 6.98 | 4.61 | 7.38 |
| September | 2.77 | 11.24 | 1.94 | 2.57 | 3.29 |
| October .. | 10.72 | 21.07 | 9.81 | 5.46 | 14.16 |
| November | 10.20 | 38.60 | 11.48 | 5.26 | 21.85 |
| December | 1.21 | 19.72 | .63 | .67 | 5.05 |
| | 49.19 | 180.53 | 43.78 | 28.05 | 86.74 |

Rainfall for the Five Years, 1933–1937.

| Year. | Hope Gardens. | Castleton Gardens. | King's House Gardens. | Public Gardens, Kingston. | Hill Gardens, Cinchona. |
|---|---|---|---|---|---|
| 1933 | 113.28 | 298.20 | 50.93 | 74.52 | 170.42 |
| 1934 .. | 58.17 | 183.61 | 44.55 | 26.33 | 95.85 |
| 1935 .. | 53.75 | 189.10 | 44.03 | 27.78 | 84.64 |
| 1936 .. | 56.94 | 145.94 | 50.32 | 38.44 | 102.70 |
| 1937 .. | 49.19 | 180.53 | 43.78 | 28.05 | 86.74 |

11. Contributions to the Gardens have been received from the following:—

Local.

Mrs. F. E. Aguilar, 11 King's House Road, Halfway Tree.
H. Q. Levy, Brown's Town.
W. Cradwick, Mereworth, Mandeville.
Chas. Williams, Swallowfield, Cross Roads P.O.
Rt. Rev. Bishop Emmett, S.J., Bishop's Residence, Kingston.
G. C. Gunter, 6 Barbican Road, Liguanea.
S. C. Black, Widcombe, Liguanea.
Mrs. J. Cradwick, Mandeville.
W. Keith Mitchell, Government Laboratory, Hope.

FOREIGN.

Mrs. M. Glass, 18 Flanders Mansions, Bedford Park, London, W.4.
Mrs. C. B. Nixon, The Laglands, Lytham, Lancashire.
J. E. Higgins, Canal Zone Experiment Gardens, Summit, Canal Zone.
Curator, Botanic Gardens, Christchurch N.Z.
Dr. Popenoe, United Fruit Company.

M. S. GOODMAN,
Superintendent of Public Gardens.
E. J. DOWNES,
Horticulturist.

## B. AGRICULTURAL EXPERIMENTS, EDUCATION AND FIELD SERVICES.

### *(ii) Report of the Superintendent Experiment Station, Hope.*

*Weather.*—The rainfall for the year under review at the Station was 49.19 inches, which is below the average for the past 56 years. The first four months of the year were dry, but the plants did not suffer as water was available for irrigation. During the months of May, October and November there was a deposit of 31.14 inches, or 58% of the total for the year.

*Distribution of Cane Varieties.*—During the year 166,740 tops and cuttings of the different varieties of sugar cane were distributed. This was higher than during the previous three years. This makes a total of 4,990,903 tops and cuttings distributed free to estates and small cane farmers for the past eighteen years.

The following is a list of the varieties and quantities distributed for the five years 1933-1937:—

| Varieties. | 1937. | 1936. | 1936. | 1934. | 1933. | Total. |
|---|---|---|---|---|---|---|
| P.O.J.2878 .. | 65,939 | 73,273 | 58,961 | 73,449 | 74,869 | 346,491 |
| F.C. 916 .. | 41,659 | 11,099 | 699 | .. | .. | 53,457 |
| M.P.R. 28 .. | 41,456 | 11,695 | 792 | 12 | .. | 53,955 |
| Uba .. | 13,000 | 30,324 | 22,948 | 11,850 | 22,797 | 100,919 |
| P.O.J. 2714 .. | 3,033 | 2,078 | 12,262 | 18,548 | 21,701 | 57,622 |
| E.K. 28 .. | 475 | 2,116 | 3,485 | 2,784 | 6,175 | 15,035 |
| White Transparent | 266 | 1,364 | 1,272 | 3,773 | 2,878 | 9,553 |
| Mexican Striped | 262 | 312 | 300 | 824 | 208 | 1,906 |
| Ba. 11569 .. | 250 | 6 | 1,544 | 1,121 | 620 | 3,541 |
| B. 417 .. | 200 | .. | .. | 1,255 | 5,036 | 6,491 |
| P.O.J. 2725 .. | 200 | 2,597 | 11,953 | 26,492 | 52,032 | 93,274 |
| P.O.J. 2727 .. | .. | 1,142 | 10,612 | 9,178 | 22,922 | 43,854 |
| Co. 213 .. | .. | 850 | 1,000 | 500 | 200 | 2,550 |
| Co. 281 .. | .. | 850 | 1,000 | 500 | 200 | 2,550 |
| S.C. 12/4 .. | .. | 511 | 864 | 3,808 | 3,675 | 8,858 |
| B.H. 10/12 .. | .. | 506 | 4,591 | 2,315 | 5,135 | 12,547 |
| B. 726 .. | .. | 505 | 9,197 | 6,764 | 4,315 | 20,781 |
| H. 109 .. | .. | .. | 400 | 200 | 36 | 636 |
| B. 891 .. | .. | .. | .. | 412 | 4,015 | 4,427 |
| Badilla .. | .. | .. | .. | .. | 50 | 50 |
| | 166,740 | 139,228 | 141,880 | 163,785 | 226,864 | 838,497 |

From the above list it will be seen that the demand again this year for those varieties which are highly resistant to Mosaic Disease is far in excess of the demand for the more susceptible varieties. Cane farmers when applying for cane varieties are supplied only with those which are resistant to Mosaic Disease.

*Cane Varieties.*—The following varieties were received from the Central Plant Quarantine Station, Trinidad, on April 14th: three cuttings each of B.2935, B.3013, B.3124, B.3127, B.3138, B.3234, B.3439, P.R.803, M.P.R.42 and M.P.R 63. These cuttings arrived in good condition. The following were received on July 21st: B.34106, B.34104, B.34120, B.34137, B.34129, B.34105, B.34163, B.34130, B.34134, B.34117 and B.3172. Some of these arrived in very poor condition.

The following were received September 24th: B.34130 and Diamond 10. The Diamond 10 was received in very poor condition and none of the cuttings germinated. The following were received December 10th: B.34120, B.34129, B.34130, B.34104, B.34106 and Diamond 10. The B.34120 and Diamond 10 did not germinate.

Those varieties received on April 14th were cut up and replanted in August and are doing well, but the B.3013, B.3234, B.3127 and B.3124 are going down badly to Mosaic Disease.

All the varieties received on July 21st germinated, with the exception of B.34163 which was lost. These varieties up to now have shown no signs of Mosaic Disease.

Some of the other varieties are so susceptible to Mosaic Disease that it is uncertain whether we shall get sufficient planting material to include them in the cane variety experiments. Those varieties which are very susceptible to Mosaic Disease are not suitable for Jamaica.

*Mayaguez* 28.—Large quantities of this variety have been distributed and it is well established in the cane areas. It has been included in the cane variety experiments and some of these plots will be reaped during 1938 for the first time. As stated in the previous report this variety appears in Jamaica to be highly resistant to both Mosaic Disease and Root Disease. It also gives promise of ratooning well.

*F.C.*916.—A large quantity of planting material of this variety was distributed to the estates and cane farmers. It is a quick germinator but does not stool out until late in growth. This has also been included in our cane variety experiments and will be reaped during 1938 for the first time. From observations in the plots in the Station for the past two years this variety has always been severely attacked by the moth borer, other varieties in close proximity being scarcely attacked. It would appear that this variety has some attraction which causes the moth to lay its eggs on the leaves.

*P.O.J.* 2878.—It will be seen from the above table that the largest number of tops and cuttings distributed was of this variety, and this was due to the big demand for planting material by small cane farmers in various parts of the island at a time when they could not be obtained from Sugar Estates. It is an excellent cane for the small farmer as it is highly resistant to Mosaic Disease. The habit of developing shoots over a long period makes it suitable for the small settler who makes wet sugar in open batteries during several periods of the year.

Only small quantities of the other varieties were distributed, and those at special request.

*B.*726.—This variety is so susceptible to Mosaic Disease that no planting material has been distributed. A small plot became suddenly so badly infected that it was discarded and dug out.

Three plots of land approximately one square chain each have been ploughed, cross ploughed and furrowed and planted with B.3013, B.2935 and B.3439. We hope to obtain sufficient planting material from these to include them in our variety experiments in 1938. This, however, will depend entirely on how they stand up to Mosaic Disease. So far the B.3013 seems the most susceptible of these varieties. From appearances the B.2935 has the bad habit of lodging which would make it unsuitable for some districts in Jamaica, but it appears to ripen early.

*Pigeon Peas.*—The varieties New Era Strain "X", New Era Strain "D" and "Prensado" have never thrived with us. The plants were always attacked by thrips and were in an unhealthy condition, and they have been discarded. The variety "Local Grey," also from Hawaii, is a much hardier variety and stands up better to our conditions. This has been retained, and it is advisable to try out this variety in the country. Seeds are now available.

*Citrus.*—Budding of the navel orange was continued but the demand was almost nil. A small nursery was set out for the purpose of budding the Valencia orange to Seville orange stock and budding has already started in this nursery.

The Eddie Wasp (*Eretmocerus serius*, Silv.) continues to keep the groves and young budded plants practically free of the Black Fly.

*Coffee.*—The coffee plot gave a fair yield this year. The plot was pruned and mulched during the year.

*Mango.*—A large quantity of budwood was distributed again this year.

*Pineapples.*—A few beds of the Cheese variety were planted out with the object of obtaining plants for distribution.

*Yam.*—A variety of yam, "Horn," was obtained from Barbados and has so far given fair results in the rather heavy soil in the Station.

*Diseases.*—Mosaic Disease was kept under control by continual roguing.

*Insect Pests.*—There was little evidence of the attack of Moth Borer in the Station except on the F.C. 916.

Thrips: The mango trees suffered this year from a bad attack of thrips.

The general routine work of weeding, billing, ploughing, watering, etc., was attended to and the Station kept in a tidy condition.

M. S. Goodman,
Superintendent Experiment Station.

### (*iii*) *Report of the Superintendent of Sugar-cane Experiments.*

*Weather.*—The rainfall during the period under review was well distributed throughout the year with the exception of that during June and July which was below the average. Trelawny suffered again this year from a low rainfall and was very dry during certain periods. The good rainfall experienced during the previous year was partly responsible for the increased production of sugar this year over that of last year. During May there were heavy rains which flooded certain areas in the east end of the island, but damage to no appreciable extent was done.

*Production.*—The output of sugar for 1937, according to the Sugar Manufacturers' Association, was 103, 601 tons. This is a record production of sugar for Jamaica during the past century. To produce this amount of sugar over one million tons of cane were produced or ground at the factories. This increase is due both to enlarged acreage and an increase in production per acre. The increased production per acre is due to favourable weather conditions and improved methods of cultivation.

This figure does not include the amount of wet sugar made by small settlers which is sold only in the local markets. The amount of wet sugar manufactured varies greatly from year to year, but from a rough estimate it would appear to be over 5,000 tons annually.

At the beginning of the reaping season the sucrose and purity were low owing to the late rains, but they gradually improved as the reaping progressed.

Owing partly to favourable seasons during 1937, it is estimated by the Sugar Manufacturers' Association that the 1938 crop will be about 120,000 tons of sugar. This, if realised, will be an appreciable increase over the 1937 crop.

*Varieties.*—There was a demand for planting material of the newer seedling canes, but it was decided not to distribute these until they had been tested out in the variety experiment plots in comparison with B.H.10/12 and P.O.J.2878, which are now considered the standard varieties. The varieties M.P.R.28 and F.C.916 have been planted out in some instances in fairly large areas and an estimate of what they will do in Jamaica should be obtainable after the reaping of the 1939 crop. There will not be sufficient of these two varieties reaped in 1938 to enable us to come to any definite conclusion.

*B.H.* 10/12 is still the predominant variety and the greater part of the cane areas planted is in this variety. It is still considered the best ratooning variety particularly in the rich deep alluvial soils. From a factory point of view it is by far the best variety to grow.

*P.O.J.* 2878.—The area in this variety is being increased annually as it is the best general purpose mosaic-resistant cane. The yield of sucrose is moderate and difficulties have hitherto been encountered in the factory treatments of the juice. As a plant and first ratoon it is as good as any other variety and does better on poorer lands than the B.H. 10/12.

The varieties *B.H* 10/12 and *P.O.J.* 2878 predominate and there appears to be little prospect of their place being usurped in the near future. These varieties together occupy about 70% of the total acreage planted.

*P.O.J.* 2725.—A very small area was replanted in this variety as it is not as good a ratooning cane as P.O.J. 2878. It is often very severely attacked by moth borer.

*P.O.J.* 2727 has been planted fairly extensively in areas which are considered poor by planters. The plant cane yield is high for this area, but the decrease with ratoons is very rapid. The sucrose content of the cane is, on the whole, low.

*E.K.* 28, grown on some of the estates on the northside of the island, has given excellent results. In one instance a yield of over 80 tons per acre from a field was obtained. The area is limited where this cane seems to do well.

*S.C.* 12/4 in certain areas has given fairly satisfactory results both as plants and first ratoons. It is to be regretted that this cane is so susceptible to Mosaic disease as it is adaptable as an early maturing variety.

*Co.* 281 and *Co.* 213 planted in small areas have given good results and the Co. 281 as ratoons produced a higher yield than it did in plants. While the general characters of these two canes make them unsuitable for general planting, the results obtained from them show that they may be valuable as special purpose canes.

*B.*726 has been very disappointing and has not come up to expectations. The planters are discontinuing the planting of this cane.

Small areas of other varieties have been planted out but these must be regarded as experimental.

*Yields.*—The average yield of canes per acre over the island including plant and ratoon canes has been a record and this is partly due to climatic conditions and better methods of cultivation. In one cane district the average yield for plants and ratoons was over 40 tons per acre, and in this area the increase has been obtained chiefly by revised methods of cultivation.

There has been an increase in the use of artificial fertilizers on canes. The amounts applied vary considerably from district to district, but in certain areas there has been a tendency to increase the amount of the application. The applications are not based, in most instances, on any individual experimental trials, but depend on general observations; and in some cases a knowledge of the nutrient contents of the soil help to decide on the quantities and composition to be applied. It would be advisable for the planters to carry out some simple experimental trials of their own as a better knowledge of their requirements would be obtained, which would certainly lead to better results.

*Cane Farming.*—Cane farmers are becoming very prominent in the production of cane for the factories. It is estimated that they are now producing about 23% of the total cane ground. This is almost double the amount that was sold to the factories the previous year. Owing to the Sugar Quota now in force some of the small farmers have decided to discontinue planting, fearing that their canes may not be purchased by the factories. There has been an increase in the small settler class which grows cane for the manufacture of wet sugar.

*Manurial and Other Experiments.*—Manurial experiments were reaped at the following places: Georgia, Holland and Richmond. One experiment at Georgia was abandoned. Manurial experiments were continued at Georgia, Holland and Richmond and one was laid down at Worthy Park Estate.

Cane Variety experiments were reaped at Plantain Garden River, Belleisle, Hyde Hall, early and late reaping. Cane variety experiments were also laid out at Gray's Inn Sugar Estate and Swanswick for early and late reaping.

*Cultivation.*—It is a pleasure to report again that the cane planters are taking every opportunity to improve their cultivation where possible. The results of this can be seen in the increase in sugar manufactured during the past few years. In a district where it was the impression that mechanical implements could not be used owing to the deep drains in the fields, an attempt is now being made at knifing the fields. It is certainly an improvement on the old system and should prove a success.

*Extension.*—There has been practically no large increase in acreage owing to the quota that has been allotted to Jamaica.

*Factories.*—There is a large central factory to be erected at Frome Estate, Westmoreland, to take off the area under sugar cane that is now being reaped by seven small factories. This will entail several miles of railway line being laid down to bring in the canes from the various estates.

The West Indies Sugar Company has purchased the Sugar Estates in Westmoreland that were being worked by the Barclay's Bank (Dominion and Overseas), and the sugar estates in Vere formerly owned by the United Fruit Company.

*Diseases.*—Mosaic Disease is not as prevalent as it used to be as planters are making a better effort to keep it under control. Mosaic Disease is being so well controlled that planters are increasing their areas in B.H. 10/12.

Root Disease was very noticeable in small areas in several cane districts.

Eye Spot periodically makes its appearance in the cane areas on the north side and centre of the island. As soon as conditions are favourable it becomes noticeable but gradually disappears later on in the year.

*Insect Pests.*—The moth borer, which is controlled by natural enemies, was not much in evidence this year except in small areas, on the P.O.J.2725 chiefly.

The Sugar Cane Aphis made its appearance on a larger area this year, no appreciable damage was done to the canes as they disappeared after the first heavy rain.

A white grub was found doing damage to the roots of sugar cane on estates in Trelawny.

*Visits.*—Requests for special visits were received from several estates. These are generally in connection with any abnormal condition which may arise and which the planters desire to discuss with an officer connected with the work on sugar cane. Planters look forward to these periodical visits when they like to discuss any new methods they have in view and get the benefit of our advice. These visits are of mutual benefit to the planters and the Department.

Planters when in Kingston also call at this office to discuss matters of interest to them which do not necessitate a special visit of investigation to the estates.

M. S. Goodman,
Superintendent of Sugar Cane Experiments.

(*iv.*) *Report of the Headmaster of the Government Farm School for the year ending December 31st, 1937.*

I have the honour to present my report concerning the operation of the Government Farm School for the year ending December 31st, 1937.

*Enrollment.*—The total enrollment of students at the Farm School during the year under review averaged 52 in number. This is an increase of three over the previous year and the largest enrollment of students since 1931. The distribution of this number of students in each of the three years was as follows:—

| Term. | Years. I | II | III | Total. |
|---|---|---|---|---|
| Easter (January 11–March 24) .. | 21 | 16 | 14 | 51 |
| Midsummer (April 12–July 1) .. | 21 | 16 | 14 | 51 |
| Christmas (September 27–December 16) | 17 | 20 | 16 | 53 |

The following figures give the average enrollment during the past five years:—

| | |
|---|---|
| 1937 .. .. .. .. | 52 |
| 1936 .. .. .. .. | 49 |
| 1935 .. .. .. .. | 44 |
| 1934 .. .. .. .. | 44 |
| 1933 .. .. .. .. | 47 |

*Graduation.*—The Annual Graduation and presentation of Diplomas, Certificates and Prizes was held at the Farm School on Thursday, July 1st. His Excellency the Governor presided, and presented the Diplomas and Certificates to the Graduating students.

The following Students received Diplomas in Practical Agriculture.

Lloyd Kipling Atherton, Reading, St. James.
Rupert Henry Black, Port Antonio, Portland.
Stanley Solomon Chambers, John's Hall, St. James.
Cleveland Osbourne Clarke, Lincoln, Manchester.
Clarence Eugene Hastings, Great Valley, Hanover.
Stanley Oswald Pringle, Savanna-la-Mar, Westmoreland.
Aston Lloyd Robinson, Pembroke Hall, St. Mary.
Keith George Rogers, Kingston.
William John Stanhope Scudamore, Halfway Tree, St. Andrew.
Remel Vincent Sutherland, Bangor Ridge, Portland
Joslyn I. Young, Coleyville, Manchester.

The following students received Certificates in Practical Agriculture:—

John Davidson Francis, Highgate, St. Mary.
Anselm R. Knight, Malvern, St. Elizabeth.
Kenneth Ronald Orlando Robotham, Colonel's Ridge, Clarendon.

An exhibit of work done by the students was made in the Carpentry Shop, and visitors were shown around the Farm.

*Award of Prizes.*—The following prize awards were made:—

(i) The A. C. Barnes Cup—donated by the Director of Agriculture, Honourable A. C. Barnes C.M.G., to the best all round student in the Third Year.
In awarding this cup consideration is given to scholastic standing, ability on the sports field, and general interest taken in all the activities of the school.
Awarded to Clarence Eugene Hastings—Great Valley, Hanover.

(ii) Prizes of a Coronation Medal to the student in each of the three years who has the highest standing in examinations, sports, and general activities during the last year.
Awarded to—Third Year—Aston Lloyd Robinson, Pembroke Hall, St. Mary.
Second Year—Dudley Jonathan Philips, Jericho, Hanover
First Year—Percival Tennant, Spanish Town, St. Catherine.

(iii) A Prize to the value of half a guinea, donated by the Sports Master, Mr. H. C. Virtue, to the student, who, during the year has been the best all round athelete in the school.
Awarded to Guy Barrington Grant (Second Year) Clarke's Town, Trelawny.

(iv) A prize of a cricket bat donated by Mr. M. S. Goodman, for the student making the greatest progress in cricket during the year.
Awarded to Walter George Miller (Second Year), Kingston.

## Sports.

*Cricket.*—The school entered a team in the Evelyn Cup Competition, and tied with the Jampublico Team for first place, but was beaten by a small margin in the finals for the cup, in a match played on October 2nd.

During the season the School played 12 matches in the Cup Competition, winning six and drawing six. Seven teams were entered. The School also payed five non-competition matches, winning two and losing three.

*Football.*—The School had a very successful season. A team was entered in the Third Division and the Junior Knock Out Competition of the Jamaica Football Association.

In the Third Division nine teams were entered, the School tieing with the Jamaica Constabulary for first place. After two tie matches played at Sabina Park the School was successful in winning the cup in this Division. During the season 16 matches were played, of which 11 were won and five drawn. The School team did not lose a match during the season, in this Competition.

In the Junior Knock Out Competition 15 teams were entered. The Farm School reached the finals but was eliminated by the Kingston Football Club, who eventually won the Competition.

*Sports Day.*—The Annual Sports Day of the School, was held on Wednesday, March 24th. The attendance was large and the various events were well contested..

*Tours into the Country by Third Year Students.*—During the year the Third Year Students made several trips into the country and visited estates and holdings.

The following were the trips made from the Farm School by the Third Year Students during the year.:

February 9th—Visited Wakefield District in St. Catherine.
February 16th—Visited Jamaica Sugar Estates at Golden Grove.
October 26th—Visited the Districts of Wakefield, Dove Hall and Linstead, Tulloch and Springvale in St. Catherine.
October 27th—Visited 'Langley," Mt. James; Reid's Pen (United Fruit Company); Tobacco Station, Spanish Town Road; the Jamaica Coconut Producers Factory and the Citrus Packing House, Kingston.

The Students derive considerable benefit from these visits and I wish to express my appreciation of the permission granted by those in charge of the various properties and institutions, for allowing the students to be shown the work carried on.

*Third Year Students to Grove Place.*—As is customary, the Third Year Students spent half of each term at Grove Place, in Manchester. During the Easter Term the students left for Grove Place on March 1st returning to Hope on March 20th; in the Midsummer Term they left May 24th, returning June 26th; and during the Christmas Term the Third Years were at Grove Place from November 10th to December 15th.

The work undertaken by the students while at Grove Place is of a practical nature, and provides necessary experience for them in work under estate conditions whcih cannot be given at Hope.

*Knutsford Park Show.*—On February 24th the Farm School staged an exhibit of work done by the students at the Agricultural Show held at Knutsford Park. Considerable interest was shown in the work of the students and the course offered at the School. Many of the students visited the Show and saw the exhibits.

*Student Christian Movement.*—The Farm School Branch of the Student Christian Movement completed a successful year, under the direction of Mr. Hallett of the Y.M.C.A. to whom I must express my sincere thanks for the interest he has always taken in this phase of the activities of the School.

Two delegates from the Farm School Branch attended the Annual Conference of the Student Christian Movement held at The Grove on April 30th to May 2nd.

*Tree Planting on Coronation Day.*—A tree planting ceremony was held at the Farm School on Coronation Day, May 12th, and a tree was planted by the Students of the Farm School to commemorate the occasion.

*Organization of a Rover Crew at the School.*—During the year a Rover Crew was organized at the School under the direction of Mr. V. A. Valentine. This activity is welcome and will provide additional interest for the students. The number of Rovers in the crew is 16.

*Repairs to Buildings.*—During the summer holidays the dormitories at the school were entirely repainted inside, and the outside sanded. The buildings were badly in need of such work being being done, and are improved in appearance as a result.

*Meeting of the Farm School Advisory Board.*—A meeting of the Advisory Board was held at Grove Place on November 27th.

*Flood Loss sustained by Farm School Student.*—Student Astor Shirley, a First Year Student, whose home is at Swift River in the parish of Portland, was unfortunate in having four members of his family drowned in the flood which took place on November 24th.

*Extension Work.*—The Farm School is becoming popular for holding meetings and conferences. During the year there were three such meetings held, the Annual Departmental Conference, February 5th, the Summer Course of Lectures July 19th to 24th, and the Conference of the Sugar Technologists, December 8th.

*Visitors.*—The total number of visitors to the school during the year was 358. This includes those attending the meetings and courses held at the School.

The number as shown by those registered in the visitors' book is distributed as follows:—

| | |
|---|---|
| Departmental Conference, February 5th .. | 38 |
| Summer Course of Lectures, July 19th to 24th .. | 78 |
| Graduation, July 1st .. .. .. | 23 |
| Sugar Technologists Conference, December 8th .. | 40 |
| Parties of School Children and Members of the Jamaica Agricultural Society .. .. .. | 158 |
| Individuals .. .. .. .. | 21 |
| | 358 |

*Staff.*—A change was made in the Staff of the Farm School, when Mr. L. A. Powell for many years Senior Assistant Master was seconded for duty at Grove Place as Agricultural Superintendent. Mr. Powell's place was taken by Mr. J. M. McEwen. Mr. McEwen will teach Science while Mr. H. C. Virtue will undertake the work done by Mr. Powell and will give instruction in Agriculture, Poultry and Field Crops.

I take this opportunity of expressing my appreciation of the loyal assistance rendered by all members of the Farm School Staff throughout the year and my thanks for the assistance given by other branches of the Department.

J. W. Howe,
Headmaster.

(*v*) *Report of the Farm Superintendent for the year ending December 31st, 1937.*

I have the honour to submit herewith my report concerning the operation of the Government Stock Farm, Hope, for the year ending 31st December, 1937.

General.

Weather conditions on the Liguanea Plains made the year under review an average one. The total rainfall amounted to 48.17 inches as compared with 56.87 inches the previous year, which is 8.80 inches less.

The distribution of the rainfall was much the same as previous years, the first four months of the year being dry, which affected pasture conditions. The Spring rains did not come until May, at which time some improvement in pasture was evident. The rainfall for the remainder of the year was fairly evenly distributed, and rains carried well into December, whereas in 1935 and 1936 the Fall rains ceased at the end of October.

There were no storms during the year.

Livestock.

*Numbers.*—The total number of head of livestock on the Farm at the end of the year was 541, an increase of 39 head over the previous year. This number was made up as follows:—

| | 1937 | 1936 | 1935 | 1934. |
|---|---|---|---|---|
| Bulls .. .. | 34 | 33 | 27 | 23 |
| Purebredcows and heifers .. | 37 | 42 | 46 | 50 |
| Grade cows and heifers .. | 433 | 387 | 364 | 313 |
| Mules .. .. | 22 | 23 | 23 | 23 |
| Horses .. .. | 4 | 4 | 2 | 1 |
| Steers .. .. | 11 | 13 | 13 | 14 |
| | 541 | 502 | 475 | 424 |

*Value of Livestock.*—The total value of the livestock on the Farm at the end of the year was £7,127 4s. 0d. a decrease of £48 14s. 0d. over the previous year. The price of livestock in the Island was maintained and the price paid for butcher stock showed a slight increase towards the end of the year.

The following table shows the number of head of stock on the Farm and the total value at the end of each year.

| Year. | No. head. | Value. £ s. d. |
|---|---|---|
| 1937 .. | 541 | 7,127 4 0 |
| 1936 .. | 502 | 7,175 18 0 |
| 1935 .. | 475 | 7,607 13 0 |
| 1934 .. | 424 | 8,194 10 0 |
| 1933 .. | 412 | 8,145 16 0 |

*Calvings.*—The number of calves dropped during the year totalled 167. Of this number 85 were heifer calves and 82 bull calves. In this total is included one set of twin calves.

The sires of the calves dropped were:—

| Sire. | Heifer calves. | Bull calves. | Total. |
|---|---|---|---|
| Fon 70A .. | 24 | 24 | 48 |
| Bess's Pusa .. | 11 | 11 | 22 |
| Paymaster .. | 8 | 9 | 17 |
| The Mayor .. | 7 | 7 | 14 |
| Hope Foremost 6th | 6 | 9 | 15 |
| Stanley .. | 3 | 4 | 7 |
| K. E. P. Gamble .. | 2 | 1 | 3 |
| Glen's Prefect .. | 4 | 2 | 6 |
| Sir Douglas .. | 2 | 4 | 6 |
| Hope Theagenes 4th | 3 | 1 | 4 |
| Posch .. | 3 | 1 | 4 |
| King O. I. Beauty .. | .. | 2 | 2 |
| Sir Keyes Wayne .. | .. | 1 | 1 |
| Premier .. | 3 | 1 | 4 |
| New Deal .. | 1 | 1 | 2 |
| Corolla's Pusa .. | 5 | 1 | 6 |
| Double Folly .. | 3 | .. | 3 |
| Unknown .. | .. | 3 | 3 |
| | 85 | 82 | 167 |

*Purchases of Livestock.*—During the year only two purchases were made for the herd at Hope. A purebred Red Poll bull *New Deal* No. 56012 was purchased from Mr. Joseph Kestel, Manhattan, Illinois, U.S.A., through the Red Polled Cattle Club in the United States, and was landed on 18th February.

A purebred Guernsey bull *Foremost Vigor* No. 228109 was purchased from the Penny-Gwinn Corporation, New York, and was landed on the Farm on 15th December.

*Health of livestock.*—The health of the livestock during the year was on the whole good. The number of reactors to the tuberculin tests in July and December totalled 7.

*Deaths of Livestock.*—The total number of deaths during the year was 36, which is made up as follows:—

| | |
|---|---|
| Bulls | 3 |
| Cows | 7 |
| Heifers | 3 |
| Calves | 20 |
| Mules | 2 |
| Steers | 1 |
| | 36 |

*Licestock Sales.*—The sale of livestock during the year totalled 97 head. Details regarding the sales are:—

| Description. | No. |
|---|---|
| Bull calves for breeding | 48 |
| Yearling bull for breeding (shipped to Colombia, S.A.) | 1 |
| Sold to butcher— | |
| Calves | 24 |
| Cows | 14 |
| Heifers | 8 |
| Bulls | 1 |
| Steers | 1 |
| Total | 97 |

In the case of the older animals sold for butcher purposes, the reason for selling was old age, barrenenss or lack of development.

*Poultry.*—The Stock Farm maintains two breeding flocks, one of Rhode Island Reds and one of White Leghorns, and sells birds and baby chicks for breeding, and eggs for hatching purposes.

Eggs and fowls which are not used for breeding purposes are sold to the Farm School, and the Public Hospital for table use.

The sales from poultry during the year under review were:—

| | Rhode Island Reds. | White Leghorns. |
|---|---|---|
| Cockerels | 7 | |
| Pullets | 7 | .. |
| Baby chicks | 44 | .. |
| Eggs for hatching | 180 | 59 |
| Eggs for table use | 2,431 | 662 |

## Milk Production and Sales.

*Milk Production.*—The total production for the year amounted to 275,279.50 quarts, an increase of 10,380.25 quarts over 1936. Of the amount produced a total of 236,505.75 quarts was sold, an increase in sales of 15,298.50.

The following table gives a comparison of sales and production for the past five years:—

| | Production. | | Sales. | |
|---|---|---|---|---|
| Year. | Total for year. | Avg. per day. | Total for year. | Avg. per day. |
| 1937 | 275,279.50 | 753.3 | 236,505.75 | 647.9 |
| 1936 | 264,899.25 | 723.8 | 221,207.25 | 604.4 |
| 1935 | 267,429.75 | 732.7 | 210,202.75 | 548.4 |
| 1934 | 254,448.90 | 696.8 | 196,971.25 | 539.6 |
| 1933 | 236,391.00 | 647.6 | 198,913.25 | 517.5 |

*Butter Production.*—During the year a total of 1,824,75 pounds of butter was made. The amount of milk used was 12,724 quarts, which gives and average of 6.9 quarts of milk per pound of butter made. This average is 0.3 quarts per pound better than in the previous year.

Butter is made from the excess milk produced, and is sold for the most part to the Mental Hospital.

*Herd Production Records.*—The total amount of milk produced during the year from the herd was 275,279.50 quarts, while the average number of cows in the milking herd for the year was 145, the same number as the previous year. The average number of quarts produced daily during the year was 753.3 as compared with 725.7 for 1936, an increase of 27.6 quarts per day. The average daily production per cow for the year was 5.2 quarts, an increase of 0.2 quarts per diem over 1936.

The average butterfat content of the milk produced was 5.2 per cent., an increase of 0.10 per cent. over the year previous.

The following figures give a comparison of the various herd production records for the last five years:—

| Year. | Avg. No. Cows Milking. | Avg. daily production per cow. | Avg. daily yield for herd (qts.) | Average butterfat content per cent. |
|---|---|---|---|---|
| 1937 | 145 | 5.20 | 753.3 | 5.20 per cent. |
| 1936 | 145 | 5.00 | 725.7 | 5.10 " |
| 1935 | 140 | 5.20 | 732.6 | 5.00 " |
| 1934 | 135 | 5.16 | 697.1 | 5.22 " |
| 1933 | 132 | 4.90 | 648.6 | 5.58 " |

*Number of calves per cow in Milking Herd.*—During the year the greatest number of cows in the milking herd were those that had calved for the third time. Twenty-five heifers were included, having calved for the first time, while 28 were second calvers. The following figures list the number of calves dropped by the cows in the milking herd.

| | |
|---|---|
| 1st calvers .. .. | 25 |
| 2nd " .. .. | 28 |
| 3rd " .. .. | 31 |
| 4th " .. .. | 16 |
| 5th " .. .. | 17 |
| 6th " .. .. | 10 |
| 7th " .. .. | 6 |
| 8th " .. .. | 6 |
| 9th " .. .. | 2 |
| 10th " .. .. | 2 |
| 11th " .. .. | 1 |
| 12th " .. .. | 1 |

*Production averages by breeds.*—The following figures show the average production per head during the year of the various breeds raised on the Farm.

| Breed. | No. head. | Production (pounds) | Lactation period (days). |
|---|---|---|---|
| Grade Holstein .. | 17 | 6,036.7 | 350 |
| Purebred Red Poll | 3 | 4,560.7 | 340 |
| Grade Guernsey | 36 | 4,498.2 | 319 |
| Grade Jersey .. | 43 | 4,204.7 | 312 |
| Purebred Jersey .. | 4 | 3,663.7 | 311 |
| Grade Montgomery | 17 | 3,952.1 | 283 |
| Purebred Guernsey | 3 | 2,644.2 | 276 |
| Miscellaneous Breeds | 14 | 4,375.7 | 317 |

*Public Stud Services.*—The number of public stud services during the year was 36, a decrease of 7 over the previous year. Of the 36 services 9 were to the Jersey bull and 27 to the Guernsey bull.

In February, the Farm was unfortunate in losing the Jersey bull, *Hope Victor*, which was standing for service, and as the number of Jersey sires on the Farm is limited, it has not yet been possible to replace him. This probably accounts for the decrease in the number of services, as the Jersey breed is popular throughout the Liguanea Plain area.

## Feed and Crops.

*Feed used.*—During the earlier part of the year the drought seriously affected the pasture, and it was necessary to purchase bundles of grass from the General Penitentiary, in order to keep up the milk supply from the dairy herd.

Guatemala grass, guinea grass and cane were also used, but the drought reduced the amount obtainable on the Farm early in the year. Silage was used to supplement the lack of pasture, and as usual was found to be most valuable in this regard.

The amount of feed used during 1937 was slightly less than that used during the previous year. The price of imported feeds however advanced, with the result that an increased amount had to be spent for the concentrated feeds imported during the year.

The Stock Farm supplied the feed required at Grove Place during the year.

The amounts of the various feeds used during the year are set out below:—

| Feed. | Amount used. | Weight per bag. |
|---|---|---|
| Coconut Meal .. | 78½ tons | (Purchased locally) |
| Cottonseed Meal | 500 bags | 100 lbs. |
| Linseed Meal .. | 100 " | 125 " |
| Bran .. | 400 " | 100 " |
| Oats .. | 318 " | |
| Milk Powder | 90 barrels | (200 lbs.) |
| Rock Salt .. | 32 bags | |
| Grass .. | 9,600 bundles (bought from General Penitentiary) | |
| Canes .. | 612 tons (2,000 lbs.) Grown on Estate | |

*Silage.*—A total of 60 acres was planted with guinea corn for silage, and due to the excellent rains late in the year the crop of corn was heavy and of good quality. All three silos were filled, and as the guinea corn was cut at the proper stage of maturity it is expected that the quality of silage made will be the best for several years.

*Guatemala Grass.*—This grass is proving to be one which does well at Hope, and was introduced by Mr. Thelwell and Mr. Sutherland from Trinidad. It is a rank growing crop resembling cane, and while it has not yet been properly tested for drought resistance, it does, under normal conditions, give excellent yields, and is relished by the stock.

*Mangoes.*—The mango crop during the year was very good, and carried over a longer period than in former years. A total of 4,916.75 dozens was exported by the Marketing Division of the Department and results show that the fruit landed with the lowest loss of any year since exporting of mangoes has been undertaken.

There was a fair local demand for mangoes, but the local demand is decreasing each year, as more budded trees on the Liguanea Plain come into bearing.

*Re-afforestation.*—Re-afforestation on the Liguanea Ridge was continued during the year with satisfactory results. It was found that planting seeds from the various trees in the area was much more satisfactory than planting seedlings. The Students of the Farm School assisted in the work in this connection.

The Forestry Officer very kindly made a survey of the area, and recommended the establishment of certain trees, and the system which it was thought advisable to use in such work.

Since all tenants have been removed from the Ridge there has been less trouble from fires, and it is hoped that in time the Ridge may become well established with trees, and prevent destruction of the land from fire and erosion.

## Buildings and Improvements.

*Foreman's House.*—The old house in which the Estate Foreman lives was renovated and enlarged during the year, and now presents a more pleasing appearance. Three rooms were added together with the necessary outbuildings.

*Litter Carrier and Manure Shed.*—An over-head litter carrier was installed in the dairy buildings, which greatly facilitates the cleaning of these buildings. A manure shed was erected behind the buildings to accommodate the manure spreader, and the manure is now put directly into the spreader. The use of such a house not only saves time but also conserves the manure, as washing from rains is prevented.

*Completion of fence at 100 Stanchion Building.*—Although the 100 stanchion dairy building was erected in 1933, it was not found possible to complete the fence around it until this year.

The fence erected was one of concrete fence posts with boiler tubes as rails. The completion of this fence now adds to the appearance of the building.

*Tree Planting on Farm Grounds.*—To commemorate the occasion of the Coronation, a royal palm was planted by the Director of Agriculture at the head of the drive into the Farm. A tree was also planted near the clipping shed by Wilfred Willis, the employee who has been longest on the Farm, to commemorate the occasion of the Coronation of Their Majesties.

An avenue of Cassias was planted along the main roads of the Farm leading to the office, and will in time improve the appearance of this area.

## Extension Work.

*Exhibit at Knutsford Park Show.*—The Stock Farm erected a building to house the exhibit of the Department at the Knutsford Park Show held on February 24th. The Farm staged an exhibit of feeds and breeding records of animals on the Farm.

An exhibit of dairy cattle of the various breeds totalling 14 head was also made, and records of breeding and production given in the case of each animal. Considerable interest was shown in the exhibit and information concerning the breeding, feeding and management of the stock was given.

*Visitors to the Farm.*—The number of visitors to the Stock Farm was about the same as the previous year. More schools and Branches of the Jamaica Agricultural Society are taking advantage of bringing their members to the Farm and being conducted around. Guides are provided and the work of the Farm is explained.

*Employees' Football Competition.*—A football competition for the employees in the Department was organized in 1936. Five teams were entered. There were the Estate, Steerman, Dairymen, Ploughmen and Gardens.

The employees took a very keen interest in the competition and the Dairymen team won the Cup which was kindly donated for annual competition by Messrs. D. H. Henderson and Company.

The Director of Agriculture kindly presented the Cup to the winning team at the conclusion of the competition.

*Purchase of Hope Pastures.*—During the year the property known as Hope Pastures, containing 120 acres, adjoining Hope Gardens and the Farm was purchased by the Farm. The addition of this property will provide more pasture, which is badly needed with the increase of the herd on the Farm.

The land was cleaned and re-fenced and an area established in guinea grass.

It was decided to locate the Tuberculosis Sanatorium on this land, and work along this line was commenced during the year. The Sanatorium will be located near the Barbican Road entrance to the property.

I wish to thank the members of the Staff of the Stock Farm and Farm School for their loyal co-operation throughout the year.

J. W. Howe,
Farm Superintendent.

*(vi.) Report on Grove Place Stud Farm and Experiment Station.*

I was seconded for service to act as Agricultural Superintendent, in charge of Grove Place, as from October 1st, on which date I assumed duties.

## A—Weather.

The rainfall for the year was the lowest on record for the past six years, there having been 126 rain days with a total of 77.87 inches. The average fall for the previous 5 years was 106.28 inches with a record precipitation of 134.72 inches during last year.

## B—Experiment Station.

The Station now embraces Sections "A" (Nursery, Banana, Coffee, Miscellaneous collection of Grapefruit and Oranges, Pawpaw, Pineapples and Vegetables); "B" (top-worked Grapefruit—principally of Marsh Seedless variety); "C" (Cover and Ground Crops) and "D" (Grapefruit, Oranges, Banana, Coffee, Cover Crops and Guatemala Grass).

All these Sections are now fully established and continue to serve as a source of interest and instruction to the Agricultural Students, as well as to Farmers, large and small.

In addition to the Sections mentioned, there is also fully 8 acres now being established with various varieties of orange, and two Manurial Experiments involving 16 acres of grapefruit and 5 acres of bananas.

### Crops.

(a) *Fodder Crops:*

i. Alfalfa:—The success achieved under garden scale conditions was not maintained when pasture conditions were applied, and it would appear that the technique of establishing Alfalfa under pasture conditions needs further investigation.

ii. Clover (Hubam):—This variety continues to do well under garden conditions at Section "A", and it is proposed to extend the area when seeds become available.

iii. Clover (Australian Red):—A sample of seeds of this variety was obtained during the year, and a small plot set out in Section "A". It appears to be somewhat delicate, but it is too early to arrive at any definite conclusion.

iv. Guatemala Grass:—This grass does exceedingly well when cultivated and given some Farm Manure. With a fair rainfall it is possible to cut at intervals of four weeks, at which stage it is best relished by dairy cows. It is proposed to extend the area during 1938.

(b) *Tobacco.*—A small plot of one square chain of the Virginia variety was set out during the latter part of the year. The weather has been somewhat dry, but the plants are coming through quite well. Harvesting of the leaves will begin early in 1938.

(c) *Covers.*—The effort made to establish both *Centrosema pubescens* and *Indigofera endecaphylla* through the banana plot at Section "A" was maintained, and although the spread of both these covers is somewhat slow, the indications are sufficiently encouraging as to warrant a continuation of the trials.

(d) *Citrus.*—The crop was a very heavy one but demand for fruit, except in the very early stages of the Season, was slow. There was no demand for Seeded Grapefruit. We have reaped and delivered for export 387 boxes (chiefly Marsh Seedless Grapefruit) to the Marketing Division of the Department.

A survey of Fiddler Beetle trouble led to important discoveries with regard to life and habits of Fiddlers and their influence on Citrus in Manchester. Trials of control use of "Seekay" was not successful. A system of breeding and liberating control wasp (*Tetrastichus haitiensis*) was inaugurated. Consistent hand-picking has been instituted with the result that fully 37,125 Beetles were caught over a period of seven months.

(e) *Coffee.*—The short topped trees at Section "A," due to failure of shade, suffered from exposure. The permanent shade trees set out are not yet well established, and are therefore not capable of supplying the amount of shade required. Bananas are still being used as temporary shade, but during the dry spells, very little shade was available from these. A small Nursery of Guango Seedlings has been established and it is proposed to set out these as additional shade trese. Experiment in controlling slugs on coffee trees by the use of "Ostico" was undertaken but was not successful.

(f) *Banana.*—The plot comprising of nine-tenths of an acre at Section "A" was replanted in June with an application of Sulphate of Potash at the time of planting. The plants grew out splendidly, but became infected with Leaf Spot during October. Spraying with Bordeaux Mixture was instituted and has kept the disease under control.

(g) *Miscellaneous.*—Papaya:—Several new varieties were introduced with a view to cross fertilization to develop mosaic-resistant varieties. Plots of the following were cultivated and the production disposed of through the Marketing Division of the Department—Sweet Peppers, Egg Plants, Vegetable Marrow and Carrots.

(h) *Nursery.*—The citrus and coffee nurseries were maintained. About 1,500 budded plants of Marsh Seedless Grapefruit, Parson Brown, Valencia and Navel Oranges, will be ready during 1938 for distribution. During the year we distributed 1,820 Bitter Damsel Seedlings and 750 Citrus Buds.

## C—Livestock.

(1) *Cattle.*—The policy of grading up the herd has been continued and fully 25 of the cows have been brought under dairy conditions. New rations for bulls and new dairy feed were tried out during the year with success. We have up to the end of the year made 1,997 pounds of butter, at an average of 7.7 quarts to the pound. At the Mental Hospital we find a ready market for the disposal of all the butter made None of the cows under test have as yet completed their lactation, but I may here record the returns for 7 months of the 5 best cows:—

| | Milk Yield. | Butter Fat. |
|---|---|---|
| (1) Miss Lee .. .. | 5,566.1 qts. | 261.3 lbs. |
| (2) Vivia .. .. | 4,137.6 " | 231.1 " |
| (3) Audre .. .. | 3,636.0 " | 164.7 " |
| (4) Miss V .. | 3,508.0 " | 161.3 " |
| (5) Lily .. .. | 2,956.0 " | 158.2 " |

All animals were presented to the Valuators and appraised at a total valuation of £1,815 10s. 0d. This shows a slight increase on the valuation of the previous year. The average valuation for the past five years is £1,988 11s. 5d. The decrease in the total valuation is primarily due to the absence of high priced imported bulls. Twenty-two animals were draughted and sold to the butcher.

(2) *Mane Stock.*—The imported thoroughbred stallion "Snow Boy" maintained good health throughout the year. The record of "Hebe" the champion two-year-old for 1937—winning six of her seven engagements— has brought reflected glory both to "Snow Boy" and "Pinafore."

The stallion "Exaggerated" was also available for service during the year, but he was not well patronised.

The proof Ass "Senator Owen" kept good health except for mild abrasions on the hind leg. He received fair patronage, which I believe, would be increased but for the argument that the fees charged are high.

The mares kept excellent health, and the thoroughbreds were specially fed. The use of Lime Sulphur Wash gave very encouraging results in the control of Psarcoptic Mange.

(3) *Pigs.*—The demand for young stock is still in excess of our supply, but we are gradually working off the arrears. The "Berkshire Breed" has deservedly become very popular throughout the Island.

The Farm Piggery now consists of two boars (one native purebred and one imported) and six purebred sows. There was an appreciable increase over last year in the number of sows sent by the public.

(4) *Stud Service.*—There was an increase in the number of mares sent to "Snow Boy". A decrease in the number of cows sent was due, I believe, to the uncertain prospect of the Milk Industry.

The half-bred Suffolk Ram "Grove Token" was available for service during the year and received better patronage than the did the previous year.

Animals at the Stud were:—

| | | |
|---|---|---|
| i.—Mane Stock | Stallion | Snow Boy |
| | do. | Exaggerated |
| | Jack | Senator Owen |
| ii.—Cattle | Bulls | Theagenes (Red Poll) |
| | | Etta's Pogis, Glen's Prefect } Jerseys |
| | | Hope Foremost 5th Guernsey |
| | | Cortes, Selassie } Mont.—Guernsey |
| | | Justice Mont. Brown Swiss. |
| iii.—Pigs | Boars | Grove Marqus, Grove Viscount, Copid Sweeping Charlie } Berkshires |
| iv.—Sheep | Ram | Grove Token (Suffolk) |

(5) The tables given below show the livestock at Grove Place in December, with their valuation, Records of Service, Sales, Births and Deaths during the year.

TABLE I.
LIVE STOCK AND VALUATION.

| | Cattle. | | | | | Other Stock. | | | Bees. | Total. |
|---|---|---|---|---|---|---|---|---|---|---|
| | Bull and B.C. | Cows. | Grade Heifer | C.C., 1937. | Steers. | Horsekind. | Pigs. | Sheep. | | |
| No. .. | 5 | 62 | 46 | 25 | 4 | 37 | 17 | 6 | | |
| Valuation .. | £45 10s. | £618 | £272 | £65 | £68 | £666 | £61 10s. | 9 10s. | £10 | £1,815 10 |

TABLE II.
SERVICES, 1937.

| | Mares to Stallion. | Mares to Jack. | Jennets to Jack. | Cows. | Sheep. | Sows. |
|---|---|---|---|---|---|---|
| Farm .. .. | 4 | 2 | 1 | 59 | 2 | 6 |
| Visiting .. | 25 | 10 | 7 | 58 | 8 | 43 |
| Totals .. | 29 | 12 | 8 | 117 | 10 | 49 |

TABLE III.
BIRTHS, 1937.

| | Foals. | | | | Calves. | | Pigs. | | Lambs. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Colts. | Fillies. | Mule Cubs. | Donkey Cubs. | B.C. | C.C. | Boars. | Shotes. | Ram. | Ewe. |
| No. .. | 2 | 2 | 1 | 1 | 25 | 27 | 20 | 15 | 3 | 1 |

TABLE IV.
Sales, 1937.

| | Colts. | Boars. | Shotes. | Draught Cattle. | Calves. | Total. |
|---|---|---|---|---|---|---|
| No. .. .. | 3 | 7 | 9 | 22 | 24 | 65 |
| Value .. .. | £40 10s. | £15 15s. | £8 10s. | £159 11s. 9 | £10 10s. | £234 6s. 9d. |

TABLE V.
OBITUARY LIST.

| | Cow (destroyed). | Bull. | Calves. | Mules. | Lambs. | Pigs. |
|---|---|---|---|---|---|---|
| No. .. .. | 1 | 1 | 4 | 2 | 1 still born. | 18 crushed at birth. |

### D. Agricultural Education.

Three periods for practical work in Field and Animal Husbandry for Senior Farm School Students, were held when two separate batches of 14 students were in residence. The period at Easter, was unusually short (3 weeks) owing to the lack of an adequate water supply.

The Students participated in the various activities of the Stock Farm and Experiment Station, and in addition, Field Days involving visits to estates, factories, properties and small farmers' holdings were observed.

Several organized parties, chiefly members of Branch Societies, paid visits to the Farm for observation and advice.

### E. Lectures.

Lectures were delivered at the following meetings:—
Short Course at Hope
St. Elizabeth Branches Associated and
Manchester Branches Associated.
In addition daily lectures and demonstrations were taken with the Farm School Students in residence.

### F. Buildings and Equipment.

The new range of stables which were started in 1936 were completed during the early part of the year, and now present a most imposing structure which has added greatly to the appearance of the compound. The dairy buildings with stanchions were repaired and put in use.

To our great delight excavation for a new tank of approximately 85,000 gallons capacity, was started during the latter part of the year. When this is completed it will go a far way in relieving the anxiety of the management so far as water for the stock is concerned. The need for a small tank to supply water for domestic purposes is very keen.

### G. Staff.

Mr. A. F. Thelwell, Agricultural Superintendent, was seconded for service as Secretary of The Jamaica Agricultural Society.

Mr. T. P. Lecky, who was appointed to the post of Stock Inspector was temporary assigned to the parish of Manchester, with head quarters at Grove Place.

Mr. I. W. Lawrence, resigned his position as an Agricultural Assistant, to take up an appointment as Agricultural Master, at the Holmwood Practical Training Centre, and was succeeded by Mr. D. R. Stanley.

I desire to record my appreciation of the support received from the various members of the Staff.

### H. General.

The need for building improvement and extension, as well as better lighting facilities, calls for favourable consideration, so as to enable us to keep pace with the demands of the Division.

L. Anglin Powell,
Actg. Agricultural Superintendent.

## (*vii*) *Report of the Senior Veterinary Officer for year* 1937.

### A. Weather Conditions and Livestock.

Rainfall and general weather conditions in 1937 were favourable for livestock.

The Government Weather Report for the year shows the following rainfall in inches for the four weather divisions of the Island, etc.:

| | Divisions. | | | | | |
|---|---|---|---|---|---|---|
| | N.E. | N. | W.C. | S. | The Island. | Avg. for 60 yrs. |
| Total 1937 .. | 100.03 | 62.09 | 91.81 | 55.83 | 77.44 | |
| Total 60 year Average | 99.54 | 56.68 | 87.84 | 51.42 | | 73.87 |

an excess of 3.57 inches.

The mean number of rainy days in 1937 was 128, while the average for 35 years was 122—an excess of 6 days. The mean rainfall per rainy day was 0.60 inches.

The rainfall for the first half of the year was 3 per cent. below the average, but 10 per cent. above in the second half. February, March and April were, as is usually the case, the driest months of the year with a mean fall of 2.36, 3.07, 3.62 inches, respectively, while January, June, July and September and December were next in small rainfall, namely, 4.35, 4.37, 4.97, 4.84, 4.82 respectively.

The mean rainfall in November far exceeded the average in all Divisions, especially in the North-eastern and Northern Divisions. Exceptionally heavy rains fell on the 21st and 22nd in the northern and western parishes with severe damage to roads in St. Mary, St. Ann, Trelawny, St. James and Hanover, particularly the two last parishes. Flood rains in Portland (N.E. Division) on 23rd–24th resulted in great damage to roads, bridges and private property, and the loss of many lives.

Similar flood rains causing extensive damage to roads, bridges, private property and also loss of human life, chiefly from a landslide at Millbank, occurred again in Portland (N.E. Division) on the 8th December.

There are no figures of the loss of livestock incident to these three unusually heavy and intense rainfalls, but much small stock is reported to have been destroyed in the local floods in Portland and St. James.

## B. Island Livestock Production and Markets.

1. *Horses, Mules, Asses (Mane Stock)*—

(i) *Horses.*—The breeding of horses has steadily declined since the advent of the motor car which rapidly supplanted carriages, buggies, hackney cabs, as well as riding ponies of the country parts.

This change in general social and business transportation has indirectly and adversely also affected mule-breeding in the Island, both by the elimination of buggy and van mules and by reduction in the number of better type mares.

Horse-breeding is now confined almost exclusively to racehorses and polo ponies; the former class in particular is now feeling the pressure of the increasing importation of racehorses from England principally with a few from U.S.A. and Haiti.

The problem of the future with this industry is mainly the acquisition and maintenance of good type mares for breeding purposes (horses and mules).

(ii) *Mules.*—The mule like the horse is retiring, though more slowly, as motor trucks and motor vans take his place in transportation, and the paved or smooth tarred roads improve motor traffic and handicap him.

Within the last two years pneumatic rubber tyres on animal drawn vehicles have come into increasing favour, and have given the mule some larger part in transportation, both in the towns and on the plantations.

In general the price for good type mules in 1937 showed an advance of about 20 per cent. as compared with the two previous years, tht is, from £11–£12 to £13–£15. Off-type and undersized mules of £7–£10 are on the increase and the prices obtainable are stationary or inclined to fall. Further, in the horse and mule breeding areas the pastures have deterioriated in the process of years from droughts, too frequent grazing, overstocking, with result that much of the better kinds of grasses have died out or been supplanted by types inferior for grazing purposes, although in many cases they are hardier and more drought resistant.

(iii) *Asses.*—These useful and popular animals still play their part as beasts of burden and bid fair to continue on the scene for many years to come. Employed in the country parts (mountainous area) exclusively as pack animals, many unfortunately are now being used, especially, though not exclusively, on the coastal plains, for draught in drays and carts of dimensions and weight originally intended for mules. This unfortunate transition has imposed additional hardship on the faithful donkey, which is tantamount to cruelty, when the proportions of the cart or dray in design and weight are outside the limits of proper adaptation of the vehicle to the size and draught power of the small donkey, and little or no discretion is shown in the nature and amount of the load.

Donkeys in Jamaica are in general small, light-boned and poorly muscled because of non-selective breeding, under-feeding or poor grade feeding in their growing years, and the general hard conditions of their subsistence and minimum of care.

There is no species of the domestic animals in the Island which responds more quickly and permanently to improved breeding, feed and care than the native ass. This is very evident when the donkeys of the better grazing areas of St. Elizabeth, where some selective breeding of the ass is still practised, are compared with their fellows in other parts of the Island.

In general the ass breeds under natural uncontrolled conditions, often at too early an age, and ekes out a living on scanty, poor quality feed and withal performs daily work for its owner. Under such circumstances the young progeny are not properly nurtured and lack growth and good development.

Their market prices are from £2 to £6 depending on their type, age, size and the locality of the markets

2. *Cattle (Horn Stock)*—

(i) The average Island production of cattle has been maintained and the local market for butcher's stock has been adequately supplied. Prices have remained as low or at best only slightly better than in the last four years. The market is subject to periodic slight improvement when fat stock are not available and then declines when feeding conditions improve and owners are anxious to sell.

The demand for planter's steers is steadily decreasing year by year as motor trucks on the banana and sugar cane plantations are more generally adopted, because of their suitability for long distance hauls, more rapid and less injurious carriage for fruit and their capacity to transport increasingly heavy loads as the public roadways are improved.

This change is causing the abandonment on several pens of the breeding of genuine planter's steers (highly bred Zebus) and as an alternative the production of beef cattle is taking their place. This tendency along with the ravaging of many banana plantations by Panama Disease and increased cattle-rearing thereon is increasing the production of butcher's stock, especially of the class of high content of Zebu bood, and thereby augmenting the market supply of second rate beef carcases, which by their preponderance affects adversely the price of the better types of beef cattle. In general, there is a larger beef market for the lower types of carcases at a low price than for the higher grades of carcases at a higher figure, because of the limited purchasing power of the population. Price per pound rather than quality of product appears in general to be the deciding factor.

(ii) *Dairying.*—No figures are available regarding the quantity or consumption of locally produced market milk, but general enquiry indicates that average annual output was maintained or slightly increased in 1937, and that the demand is increasing.

Butter producers generally are discouraged by the continued low price of their product, which is virtually rregulated by the price of the imported article, chiefly from New Zealand and retailed at 1/2–1/6 per pound.

Some makers have ceased operations and others are lessening their output or seeking other more profitable ways of disposing of their milk.

3. *Sheep.*—

The market for sheep's mutton is very limited and not likely to increase, for the price to the consumer (1/- – 1/3 per pound) is definitely high in view of the general poor quality of the product.

In only a very few instances is sheep rearing taken seriously and conducted along lines conducive to good type animals, adequate feeding for good lamb production and vigorous health of the flock.

As managed in Jamaica at present, sheep in flocks of more than about 50 head seldom do well, probably because of their parasitic diseases, and, further, being difficult and expensive to confine to their grazing lands, (often surrounded or adjacent to peasant cultivations) their range in most cases is limited and depleted with bad results.

They thrive best on the coastal plains near the sea, where brackish water and feed as well as the drier climate appears to counteract to an appreciable degree their various forms of parasitic diseases.

4. *Goats—*

Goats are kept in all parts of the Island by the peasants, generally in small groups of 4–16 head. On the arid portions of the coast and in interior parts where there are large tracks of waste land covered with brush and unsuitable by drought and poor soil for cultivation, they run at large in bands. In other places they are generally tethered to prevent them from destroying cultivated crops. Much of the rough, shallow-soil land in the semi-arid parts of the Island is admirably adapted to the rearing of goats, especially if large tracks are obtainable or can be secured by pooling contiguous small holdings in such areas and effectively fencing the few spots which may be utilized for food crops.

These animals find ready sale for goat's mutton at 6d. per pound to the consumer in the country markets, and 9d. per pound in the towns. Their skins are a valuable export asset and go chiefly to the U.S.A.

5. *Pigs—*

Pig rearing and keeping in the Island is along much the same lines as goat keeping. There are but few real pig farms. Most of the larger livestock properties keep a few pigs around the residence, where they are fed once daily and then roam the pastures adjacent to the residence and return at nightfall. In this way they are a mere side-issue on the property.

Like the peasants' goats they range at large in areas where cultivation of crops is not profitable, because of poor lands and semi-arid climate. Under such conditions they are in general under-nourished, lack development and simulate the type known as the "razor-back hog."

In cultivated areas they are usually styed or tethered by the peasant, fed on the waste of the cultivated crops and some maize and as result make fair to good porkers.

Around Kingston in particular, and to a less extent in other towns, pigs are being kept in large numbers in small groups and are fed garbage from hotels and restaurants supplemented with coconut meal.

As in other countries, garbage feeding is invariably associated with the risk and outbreaks of swine fever (hog cholera). Consequently, garbage-feeding of hogs will remain an unprofitable undertaking for those who engage in the practice until they learn that hogs can be immunized effectively by the serum-virus method.

Pork is a popular meat with the working classes and peasants, therefore fat (well-conditioned) hogs find ready sale for slaughter and retail at 6d.–9d. per pound according to the location of the market.

6. *Poultry.—*

Poultry keeping in general is confined exclusively to fowls and is a minor industry capable of much expansion, because of the increasing demand for table poultry and good eggs. All the peasants keep a few fowls around their homes where they subsist by ranging chiefly and a limited amount of hand-feeding with grain.

Around Kingston and Montego Bay in particular, poultry farming is being developed, but is seriously handicapped by flock diseases, such as fowl pox (very common and recurrent), fowl cholera and roup-like conditions, and the high price of proper feed stuffs and poultry thieves. Young table birds retail at 9d – 1/- per pound, old birds at 6d.–8d. per pound according to locality.

## C. Import and Export Trade in relation to the Livestock Industry.

The Trade Report of the Colony for 1937 shows the following imports and exports of farm animal products compared with 1936.

1. *Imports—*

| Article. | Quantities. | | Values (c.i.f.) | |
|---|---|---|---|---|
| | 1936. | 1937. | 1936. | 1937. |
| Meat as:— | lbs. | lbs. | £ | £ |
| Beef—wet salted .. | 992,322 | 1,153,430 | 16,454 | 20,730 |
| Ham .. | 320,734 | 417,658 | 17,122 | 20,787 |
| Pork—wet salted | 613,504 | 552,600 | 14,329 | 13,414 |
| Milk, condensed .. | 7,994,120 | 8,984,270 | 111,797 | 119,258 |
| Butter .. | 1,099,629 | 1,011,618 | 47,050 | 45,636 |
| Butter substitutes | 717,810 | 571,381 | 13,746 | 11,220 |
| Cheese .. | 527,723 | 545,037 | 17,004 | 18,761 |
| Lard and its substitutes | 1,000,756 | 954,978 | 19,595 | 19,121 |
| Total products | 13,266,598 | 14,190,972 | 257,097 | 268,927 |
| Total Meat Products excluding lard and its substitutes .. | 1,926,560 | 2,123,688 | 47,905 | 54,931 |
| Total Dairy Products excluding butter substitutes .. | 9,621,472 | 10,540,925 | £175,851 | £183,655 |

2. *Exports and Domestic Production:—*

The only available figures indicative of domestic production and exports of animal products (hides, skins) are:—

| Article. | Quantity. | | Value. | |
|---|---|---|---|---|
| | 1936. | 1937. | 1936. | 1937. |
| Cattle slaughtered in Island for beef estimated at £6 10s. 0d. per head .. | 34,584 | 36,719 | £225,796 | £238,673 |
| Market milk—estimated 1/- per gallon on farm | 730,000 (estimated) | 730,000 | £36,500 | £36,500 |
| Butter—locally made at 1/2 per lb. on the farm .. | 110,000 (estimated) | 100,000 estimated) | £6,415 | £5,833 |
| Hides (exported) (number) | 21,547 | 24,807 | 11,322 | 17,627 |
| Skins—goat (number) | 231,551 | 183,042 | £20,811 | £22,109 |

There are no figures for the number of sheep, goats and swine slaughtered for meat annually, but the annual export of goat skins may be taken as a fair index of the domestic consumption of goat's flesh—and average of about 200,000 head. The number of sheep slaughtered is probably about 5,000–6,000 head, and of swine £120,000.

3. *Imports of Livestock.—*

| From | England. | United States of America. | Haiti. |
|---|---|---|---|
| Racehorses .. | 18 | 4 | 1 |
| Brood mares .. | 3 | .. | .. |
| Cattle .. .. .. | | 2 bulls (Red Poll & Guernsey) | |
| Swine .. .. | 2 boars (Berkshires) | .. | .. |
| Dogs .. .. | 35 (2 intransit) | | |

Poultry: 13,339 baby chicks in 116 consignments from U.S.A. (Florida mainly) by aeroplane.

4. *Export of Livestock.—*

Horses and Mules—Racehorses: 2 from England re-exported to England.
Riding pony: 1 to England.
50 mules to Guatemala, Central America.

Cattle—1 Nellore bull to Haiti
3 Nellore bulls to Ecuador.
1 Holstein-Friesian bull to Colombia.
2 North Devon bulls to Cuba.

Annual importations of baby chicks by aeroplane chiefly from Florida, U.S.A.:
1932—a few experimental lots.
1933—2,883 chicks.
1934—13,570 chicks in 91 consignments.
1935—16,016 chicks in 98 consignments.
1936—7,766 chicks in 74 consignments.
1937—13,339 chicks in 116 consignments.

## D. Field Work on Diseases.

1. *Infectious Diseases under the Law, Law 29 of 1922—*

All reports or rumours of outbreaks of these special diseases in 1937 were promptly investigated and dealt with under the Law when established.

(i) *Foot and Mouth Disease.*—No outbreaks were reported or discovered during the year. Its last occurrence was in August 1926.

(ii) *Anthrax.*—Reported outbreaks were investigated at:—

(a) 1. Beverly, St. Ann, (27.1.37) 2. Alligator Pond, St. Elizabeth, (10.5.37); 3. Toby Abbotts, Clarendon; 4. Blue Mountain Pen, St. Thomas (14.5.37); with negative results.

(b) Friendship, St. Elizabeth, (14.2.37) with positive result. The property was accordingly quarantined from 14.2.37 to 5.4.37, and the horses, mules, cattle and sheep thereon vaccinated.

On known anthrax infected properties owners are advised and in some cases assisted in the preventive annual vaccination of their stock, and particular surveillance of such areas is maintained by the Department.

(iii) *Swine Fever* (Hog Cholera) (a) Two suspected outbreaks were investigated around Giddy Hall, St. Elizabeth, and in Pleasant Valley, Clarendon at the close of the wet season of November, and found to be pneumonia from exposure in the heavy rainy season.

(b) A highly fatal disease among garbage-fed hogs in the north-western and western portion of the Corporate Area of Kingston and St. Andrew was reported at the end of September and when investigated officially declared Swine Fever.

Enquiries showed that the outbreak had started in a limited way about two months before the date of its report, and had then attacked most of the small hog yards in the area. The mortality in general is 90 per cent.

Legal measures for its suppression by isolation methods were promptly taken, but have not proved successful under existing conditions. Immunization by the serum-virus method appears to be the only means of dealing effectively with such situations and is being instituted.

2. *Other Infectious Diseases.*—

(i) *Texas Fever* (Piroplasmosis bigeminum).—Small acute outbreaks were dealt with at:

(a) Up Park, Goshen and Mount Plenty in St. Ann.

(b) Kew Park and Woodstock in Westmoreland.

"Acaprin" as a curative agent is being tested in the field.

Large numbers of cattle on various pens show physical evidence of chronic fever of this type. In such cases systematic dipping is advised as a means of checking constant re-infection and generally the results are good. No large scale therapeutic treatment under such circumstances is attempted because it is too laborious and expensive.

(ii) *Gall Sickness* (Anaplasmosis).—Events investigated during the year at Friendship, St. Elizabeth; Llandewey, St. Thomas; Good Hope and Wales, Trelawny; established infection of cattle with Anaplasmosis, and furnished additional evidence that this type of blood parasitism is probably as widespread in the Island as Piroplasmosis begeminum—concurrent infections in most affected countries.

(iii) *Bovine Tuberculosis.*—No general tuberculin testing of dairy cattle other than those in or adjacent to the Corporate Area of Kingston and St. Andrew (executed annually by the Veterinary Officer of the Corporation) has yet been undertaken.

As in the past the Department when specially requested by owners makes tests when circumstances permit.

Tests made departmentally:—

1. Government Stock Farm, Hope—
   (a) In collaboration with the Corporation's Veterinary Officer, 139 cows in milk tested March 23–20.
   (b) Entire farm herd (501 head of all ages) July 17th–August 12th. Results reported under Stock Farm, Hope.
2. Small dairy herd (6 cows, 1–3 year old heifer and 6 calves) at Dalkeith, Manchester. Result: no reactors.

(iv) *Blackleg* (Clostridium chauvei) was unusually prevalent during the year in Manchester. Assistance in diagnosis and vaccination was rendered by the Agricultural Instructor of the area and by the Department directly through Stock Inspector, T. P. Lecky, whilst stationed at Grove Place from June–December.

The infection is a persistent menace to young cattle in most of the moist upland valleys of the Island, where, however, it is generally effectively controlled by seasonal vaccination by the larger owners themselves or by Agricultural Instructors in their work with the peasantry.

Stock Inspector, T. P. Lecky, during his visits among stock owners around Mandeville and Grove Place, Manchester, urged vaccination as a policy of protection and dealt with two actual outbreaks.

(v) *Equine Strangles* occurred:—

(a) At one racing stable in St. Andrew early in November, but was effectively checked by vaccination and isolation.

(b) At Long Hill, St. Elizabeth, towards the end of December where it was also controlled by isolation of affected subjects and vaccination of the exposed.

(vi) *Ulcerative lymphangitis* of mules of the Public Works Department and sugar cane plantations has been as prevalent as ever.

Treatment by intravenous injections of neo-arsphenamine are being tried and results so far are favourable.

(vii) *Canine distemper* continues to recur periodically in and around the towns where most of the best bred dogs are. Immunization by the Laidlaw-Dunkin method is advised and performed in special cases.

3. *Miscellaneous Diseases.*—

(i) *Arsenical sores* of cattle were diagnosed at one property, where apparently Cooper's Cattle Dip had been improperly applied or unintentionally used as a disinfectant for wounds. Fourteen cattle died from this cause.

(ii) *Garbage poisoning of hogs* with a mortality of 35 hogs in 24 hours was established on premises near Spanish Town (Lee's Farm) when reported as suspected swine fever.

(iii) *Still Births of Calves.*—A sudden storm of 14 still births among some 128 parturient cows at Worthy Park, St. Catherine, was investigated in April.

As the cows at the time of the occurrence were feeding liberally on mouldy guango pods in their pasture (Pithecolobium saman) and blood serum agglutination tests for brucella infection were negative, the mouldy pods were suspected as the cause of the trouble. The mouldy pods of this tree have on several occasions been associated with extensive skin eruptions and swellings of the mouth, muzzle, feet and other parts of the body of cattle and in other cases cause general prostration and death.

(iv) *Tick control.*—No systematic official inspection of dipping tanks and the dipping of cattle was undertaken during the year.

Tanks and herds were inspected incidentally when visits were made to pens in connection with other work by the Senior Veterinary Officer or Stock Inspector.

Regular dipping is maintained by most of the progressive cattle owners, because of its definite economic benefits.

## E. Veterinary Services in Government Institutions.

1. *Government Farm School, Hope.*—Teaching of Veterinary Science (3 periods of two hours each weekly) in the School was carried out in keeping with the curriculum.

2. Veterinary services were maintained at the Hope Gardens, Government Stock Farm, Hope; and Stud Farm at Grove Place, Manchester as reported later.

3. Services ere rendered to animals of
(i) Lunatic Asylum on three occasions.
(ii) Penitentiary once.
(iii) Public Works Department as follows:—

| | | | |
|---|---|---|---|
| 1. Half-way Tree (St. Andrew) | 21 visits | 5. Lucky Hill (St. Mary) | 1 visit |
| 2. Stony Hill (St. Andrew) | 1 " | 6. Morant Bay (St. Thomas) | 1 " |
| 3. Mandeville (Manchester) | 2 " | 7. Port Antonio (Portland) | 1 " |
| 4. May Pen (Clarendon) | 2 " | 8. Hope Bay (Portland) | 1 " |
| | 9 Buff Bay (Portland) 1 visit. | | |

As Senior Veterinary Officer I accompanied the Horse and Mule Purchasing Committee of the Department on its tours, August 23rd-26th, September 16th, November 1st and assisted in the selection and examination of the animals purchased for the Department.

*Veterinary Report on Stock Farm, Hope.*

1. *Tuberculosis.*—Two tuberculin tests of the cattle were made during the year as follows.

No. 1. March 23-26 by Mr. G. O. Rushie Grey, Veterinary Officer of Kingston and St. Andrew Corporation under its Public Health Milk Regulations.

No. 2. July 17th–August 12th, 1937, by Senior Veterinary Officer.

No. 1 Test of 139 cows in milk resulted in 4 positive reactors, namely:—1. Pure-bred Jersey, Pergola, near parturition. 2. Pure-bred Guernsey, Florina, and 3. and 4. Mermaid 1st and Rouge—grade cows. The last three killed and autopsied on the Farm showed liver lesions in Florina and no gross lesions in the others.

Jersey, Pergola, was isolated, and after calving was tested again in July by the double-intradermal method with negative results and then returned to the herd.

No. 2 test comprised all the cattle on the Farm, namely, 15 bulls (imported and native), 218 cows, 13 working steers, 175 heifers, 11 bulkins and bull calves, 62 cow calves and 7 head of other owners. Result: 4 positive reactors, namely: Doris 1st, Minerva 1st, Partridge and Sunshine 1st.

In view of the non-lesion findings at autopsy of two of the three positive reactors to the previous test of March 23rd – 26th (No. 1 test) the reactors were isolated and are being kept for retest.

Record of Tuberculin Tests of Farm Cattle for 11 years, 1927-37.

| Month of Test. | Number Tested. | Result. | Percentage Infection. |
|---|---|---|---|
| January, 1927 .. | 359 head | 20 reactors | 5.56% |
| July, 1927 .. | 303 " | 1 reactor | 0.33% |
| December, 1927 | 312 " | 1 " | 0.32% |
| November, 1928 | 297 " | 1 " | 0.33% |
| October, 1929 .. | 342 " | 1 " | 0.29% |
| August and October, 1930 | 326 " | No reactors | Nil |
| December, 1931 | 348 " | 1 reactor | 1.28% |
| June, 1932 .. | 227 " | No reactors | Nil |
| June, 1933 .. | 293 " | No reactors | Nil |
| June, 1934 .. | 407 " | 14 reactors | 3.4% |
| November, 1934 | 401 " | 7 " | 1.74% |
| November, 1935 | 457 " | 21 " | 4.81% |
| April-May, 1936 | 445 " | No reactors | Nil |
| November, 1936 | 466 " | No reactors | Nil |
| March 23-26th, 1937 | 139 " | 4 reactors | 0.8% |
| July 17–Aug. 12, 1937.. | 494 " | 4 " | 0.8% |

2. *Infectious Bovine Abortion* (Bang's Disease).—

(i) The incidence and effect of this infection in the herd is about the same as in past years. The percentage of actual abortions varies slightly from year to year and its associated troubles (sterility, delayed conception, impaired lactation) continue to impair the breeding and productive efficiency of the herd.

*Parturition and Abortion Record* 1928-37.

| Year. | Full Time Births. | Still Births. | Abortions. |
|---|---|---|---|
| 1928 | 94 | 2 | 5 |
| 1929 | 81 | 2 | 8 |
| 1930 | 118 | 4 | 4 |
| 1931 | 126 | .. | 9 |
| 1932 | 127 | 1 | 9 |
| 1933 | 144 | 4 | 7 |
| 1934 | 148 | 6 | Nil |
| 1935 | 158 | 3 | 4 |
| 1936 | 155 | 9 (5 premature twin births) | 6 |
| 1937 | 161 | 4 | 11 |

(ii) Sterility (permanent or temporary) is still a serious problem.

During the year manual ovarian treatment per rectum along with intramuscular injections of wheat germ oil was tried on 11 non-breeding cows without definite success in a single case.

During the year 21 cattle of the Farm were drafted and sold or otherwise disposed of for the following assigned reasons:

7 for sterility.
6 as undesirable types for breeding.
9 for old age.
2 working steers past further service.
1 for an incurable injury to the leg.

(iii) *Retention of fœtal membranes.*—This condition so generally associated with infections of the genital canal occurred in 12 of the parturient and aborting cows of the Farm during the year.

*Tick Fever* (Piroplasmosis bigeminum).—The Farm was singularly free of any occurrence of this disease during the year.

In spite of more or less exposure to re-infestation from stray ticky cattle and irregular dipping by a few adjacent cattle owners, the lands of the Farm are virtually tick-free and every endeavour is made to so maintain them for the safety of the Farm Herd.

On February 7th, Jersey Bull, Hope Victor, died suddenly showing dark-coloured urine and on March 7th–9th five cows, Cowslip, Corolla, Dolores, Minnie and Isabelle were sick with symptoms and coloured urine suggestive of piroplasmosis. Three of these five died within 36 hours and two recovered. Blood films from all six cases were negative for piroplasms and autopsy lesions were not indicative of piroplasmosis. Their sickness and death was assigned to the damaged feed (sour cane and spoiled silage) which was found in their feeding lots.

*Blackleg.*—One case occurred on the Farm on 17.7.37 in a not yet vaccinated young Jersey heifer, Prioress. Aggressin Vaccine was administered to all the young stock (178 in number) on 27.7.37 and to 20 additional ones (born subsequent to 27.7.37) on 18.11.37.

*Actinomycosis* was discovered as an infection of the left branch of the lower jaw of imported Red Poll Bull, "New Deal" on 15.7.37. Intermittent courses of potassium iodide for 4½ months have arrested, if not cured, the infection.

*Obstetrical cases.*—6 cases of dystokia, 12 of retention of foetal membrane, 2 of vaginal prolapse.

*Fouls of the feet* (Interdigital sores).—The herd was remarkably free of this trouble during the year—only one case.

As a precaution during wet weather the dairy cattle are kept out of mud and off muddy roads as much as possible—at least, more so than in past years.

*Garget.*—Six cases were treated during the year—in most cases only one quarter was involved.

*Pneumo-enteritis of pail-reared calves.*—This complex condition continues as the chief ailment and source of trouble among the pail-reared calves.

When the trouble is confined to the intestines many cases recover with treatment, but when the attack affects both the intestines and lungs death usually follows.

Six deaths resulted from this cause among 150 pail-reared calves.

In many of the pneumonic cases the condition of the lungs indicated infection of hemorrhagic septicæmic type. For this reason, injections of Hemorrhagic Septicæmia Aggressin soon after birth are being tested as prophylaxis. Results so far obtained are encouraging.

*List and Causes of Deaths—Horses and Mules.*—2 mules killed: "Rose"—senility; "Bill"—compound fracture of left tibia.

*Cattle—*

| Adults. | | Calves. | |
|---|---|---|---|
| Senility .. | 3 (killed) | Blackleg | 1 heifer |
| Food poisoning .. | 4 | Injuries | 4 |
| Tuberculin reactors .. | 3 | Pneumo-enteritis | 6 |
| Anaplasmosis .. | 1 | Navel infection | 2 |
| Bull "Fanfare" stationed at Llandewey, St. Thomas | | Congenital weakness | 3 |
| Total | 11 | | 16 |

*Poultry.*—The flock infections which had to be dealt with during the year were:

(i) Fowl Cholera (B. avisepticus) or Hemorrhagic Septicæmia of fowls.

This disease persists in the flock mainly as a sub-acute or chronic type of the infection causing rupture of ovisacs with a sequel of acute or chronic peritonitis resulting in death after variable periods of time.

As a control measure the flock is vaccinated periodically with Hemorrhagic Septicaemia Aggressin, subsequent to which there is always a definite decrease in the mortality.

(ii) Contagious Epithelioma (Fowl Pox or locally termed "Yaws" of poultry).—A mild type of this disease attacked many of the young birds (just when feathering) in the spring and summer months, but did not cause much mortality.

Deaths of adult birds—Total 13 birds.

3 from roup,
2 from acute cholera,
3 from chronic peritonitis with ruptured ovisacs,
1 from impaction of crop,
1 from eversion of cloaca,
1 from large tumour of liver,
1 from egg—bound,
1 from rupture of liver.

*Veterinary Report Stud Farm, Grove Place, Manchester.*

1. *Rainfall.*—The rainfall at Grove Place in 1937 was below that of the preceding year which was very much above the average, particularly in the first six months. However, it was well distributed and there was no acute drought or severe dry period at any time.

| | | |
|---|---|---|
| 1st Quarter | .. .. | 8.89 inches |
| 2nd " | .. .. | 27.51 " |
| 3rd " | .. .. | 15.96 " |
| 4th " | .. .. | 25.51 " |

Total 1937 = 77.87 inches. Total 1936 = 134.72 inches.

2. *Official Veterinary Visits.*—Twelve official visits were made to the Farm during the year—2 in 1st, 3 in 2nd, 4 in 3rd and 3 in 4th quarters.

3. *Veterinary Services, etc., during* 1937:

(i) *Psoroptic Mange of horses and mules.*—This infection was kept under control, as in past years, by periodic treatment of cases with lime-sulphur mixture as a wash. Eradication is not likely to be accomplished so long as mares from infected properties and areas of the Island are admitted to the stud. It is a a wide-spread affection of horses in the Island, and has not yet been brought under legal measures of control.

(ii) *Equine Influenza and Strangles.*—In view of occurrence of strangles as reported already under D 2 (v) of this report and the possibility of its introduction at Grove Place by mares to the stallions, precautions were taken and vaccine administered.

(iii) *Worms of Horses and Mules.*—Treatment for worms in the form of Parke, Davis & Co's. Nema Capsules (Tetrachlor-ethylene) was given to 2 yearlings, 2 two-year old (24.4.37) and 4 mares 16.8.38.

(iv) *Anthrax.*—Since the outbreak in September 1935 there has been no recurrence of this disease, but precautionary measures of vaccination are being maintained. Accordingly, 11 mares, 3 yearlings and two-year olds, 9 mules, 5 asses, 143 cattle and 3 sheep were vaccinated on 23rd April. Total 174 animals.

(v) *Tuberculosis.*—Fortunately no cases of tuberculosis have been found at Grove Place since tuberculin testing was instituted there in November, 1924.

The entire herd consisting of 5 bulls, 4 working steers, 81 cows, 45 heifers, 11 calves over 3 months of age (11 of less than 3 months not tested) was tested by the intradermal method July 26th–30th and no positive reactors were discovered.

Record of Tuberculin Tests.

| Date. | Farm Cattle. | Cattle to Stud. | Result. |
|---|---|---|---|
| November, 1924 | 214 | .. | All negative |
| April, 1925 .. | 420 | .. | " |
| July, 1930 | 162 | .. | " |
| July, 1933 .. | 150 | .. | " |
| August, 1935 .. | 141 | 5 | " |
| July, 16–30, 1937 | 146 (exclusive of 11 under 3 month-old calves) | .. | " |

(vi) *Blackleg.*—Experience shows that certain pasture areas of Grove Place are blackleg-infected and this necessitates regular vaccination of the cattle of susceptible age annually, or semi-annually, which procedure was carried out in April and September to October. There were no deaths from this infection in the year.

(vii) *Swine.*—There was no serious disease among the small group of pigs—breeding stock of 2 Berkshire boars, 3 native sows, 2 gilts—during the year.

There were five litters, one for each sow and gilt, numbering 35 pigs—20 males, 15 females—of which 17 were reared. The other 18 (10 males, 8 females) died from crushing at the time of farrowing.

4. *Births of Livestock.*—

(i) Horses: 2 colts, 2 fillies—4 total.
(ii) Mules and ass cubs: 1 each—2.
(iii) Cattle: 25 bull calves, 27 cow calves—52 head.
(iv) Swine: 35 pigs (20 males, 15 females).
(v) Sheep: 4 lambs (3 rams, 1 ewe).

5. *Deaths* (died naturally or killed)—

Horses—nil
Mules—1 from accidental injuries.
Cattle:
Jersey Bulls: 1. Etta's Pogis—senility and dislocated hip—killed.
2. Glen's Prefect—acute tick fever (piroplasmosis bigeminum).
Cows—1 cow, Trusty, killed—extreme chronic emaciation.
Calves: 2 killed—congenitally weak.
2 bull calves killed because of no sale and dams needed for dairy purposes.
Swine—18 pigs crushed at time of farrowing.

F. Educational Work.

A. 1. Lectures and demonstrations in Veterinary Science at Farm School, Hope, (3 periods of 2 hours weekly) during three school terms (36 weeks).

2. Participation in 4th Annual Departmental Staff Conference at Hope (Feb. 5–6, 1937).

3. Assistant Judge of Horse, Mule and Ass Classes at Liguanea Agricultural Show at Knutsford Park on 24.2.37.

4. (i) Assisted with Summer Course of Lectures in Agriculture at Hope, July 19–24, 1937 and
(ii) Read paper on "The Importance of Health and Disease Control in Livestock."

5. Attended meetings of Central Board of Health.

6. Meetings of Bee Industry Committee of Jamaica Agricultural Society.

7. Letters and interviews with stockmen on veterinary and livestock matters.

B. Publications: None.

## G. Statistics.

1. Cattle slaughtered for market beef, exclusive of sheep, goats, swine:—

| 1935. | 1936. | 1937. |
|---|---|---|
| 34,583 head | 34,534 head | 36,719 head |

N.B.—No figures are available for sheep, goats, swine so slaughtered.

| | Sheep. | Goats. | Swine. |
|---|---|---|---|
| Estimated | 5,000 | 200,000 | 12,000 |

2. Exports of Livestock:—

| Animal. | Number. | Class. | Destination. |
|---|---|---|---|
| Horses | 2 | Racehorses | Re-exported to England |
| | 1 | Riding pony | England |
| Mules | 50 | Pack and Draught | Guatemala |
| Cattle | 1 | Nellore bull | Haiti |
| | 3 | Nellore bulls | Ecuador |
| | 2 | North Devon bulls | Cuba |

3. Imported Livestock:—

| Animal. | Number. | Class. | Origin. |
|---|---|---|---|
| Horses | 18 | Race horses | England |
| | 3 | Brood mares | England |
| | 4 | Racehorses | U.S.A. |
| | 2 | Racehorses | Haiti |
| | 22 | Polo ponies | England |
| Cattle (Bulls) | 2 | Red Poll Bull | U.S.A. |
| | | Guernsey Bull (Dept. of Agriculture) | |
| Swine | 2 | Berkshire boars | England |
| Dogs | 2 (intransit) | Various breeds | England |
| | 35 | | |

Importation of Baby Chicks from U.S.A.:—

| 1932 | 1933 | 1934 | 1935 |
|---|---|---|---|
| A few lots | 2,883 | 13,570 (91 lots) | 16,016 (98 lots) |

| 1936 | 1937 |
|---|---|
| 7,766 (74 lots) | 13,339 (116 lots) |

4. Dipping Tanks on Register of Department:

| 1928 | 1929 | 1930 | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 | 1937 |
|---|---|---|---|---|---|---|---|---|---|
| 305 | 329 | 341 | 351 | 362 | 368 | 372 | 376 | 379 | 384 |

Several of these are out of order and not in use.

5. Sales of Paranaph and Arsenite of Soda by Government Laboratory in last 5 years to owners of registered dipping tanks chiefly:

| Lbs. | 1933 | 1934 | 1935 | 1936 | 1937 |
|---|---|---|---|---|---|
| Paranaph | 39,850 | 33,373 | 36,654 | 35,942 | 38,976 |
| Arsenite of Soda | 24,818 | 20,300 | 21,200 | 19,736 | 21,650 |

6. Registration of apiarists and apiaries:

| Area. | Year. | Apiarists. | Apiaries. | Estimated Colonies. |
|---|---|---|---|---|
| Kingston & St. Andrew | 1935 | 97 | 126 | 3,279 |
| | 1936 | 93 | 109 | 3,370 |
| | 1937 | 98 | 119 | 3,657 |
| Other Parishes .. | 1935 | 157 | 292 | 12,444 |
| | 1936 | 164 | 300 | 12,645 |
| | 1937 | 170 | 310 | 12,895 |
| Estimate for Island | 1935 | 425 | 558 | 18,000 |
| | 1936 | 450 | 609 | 19,000 |
| | 1937 | 500 | 700 | 20,000 |

## H. Report of Stock Inspector's Work.

*Introduction.*—Mr. T. P. Lecky, a graduate (1925) of the Government Farm School, Hope, and subsequently a graduate of Ontario Agricultural College, University of Toronto, Canada in 1934, was appointed as Stock Inspector in the Veterinary Division of the Department of Science and Agriculture on 1st June 1937, and stationed at Grove Place, Manchester as from June 1st, 1937.

1. *Duties.*—The duties assigned him were to visit livestock properties (commonly called pens) and the holdings of peasants for the purpose of making observations on the methods of breeding, feeding and care of the livestock maintained on such places, and, further, to assist by advice and other means the promotion of better methods and practices and also, when necessary, to render aid in sickness of stock and the control of infectious diseases in particular.

In addition he was instructed to initiate small scale dairying operations at Grove Place by selecting cows from the Grove Place herd for the purpose, have them stall-fed in addition to their pasture grazing and train them as definite dairy cows. The milk so obtained was to be made into butter and sold to Government institutions.

2. *Work in Districts and at Grove Place.*—His services during the seven months, June to December, 1937, were confined mainly to:—

*I.—Field Visits and Observations—*

Visiting livestock properties (pens of mixed animal farming) places keeping mixed types of cattle/for dairying and/or beef, a few sheep or goats, a few pigs and peasant holdings with one or a few cows, one or two asses, and a pig or two in sties or small enclosures.

In this capacity he visited from Grove Place as centre (a) 13 large properties, namely, Lyndhurst, Brumalia, Wear Pen, Kendal, Martin's Hill, Oxford, Tiverton, Bloomfield, Richmond Hill, Litchfield, Greenvale, Chudleigh, Hanbury on one or more occasions.

(b) Peasant holdings in 17 districts, namely, Somerset, Ellen Street, Grove Place Land Settlement, Litchfield, Mile Gully, Spur Tree, Devon, Mount Maria, Top Hill, Porus, Petersfield, Mizpah, Chantilly, Walderston, Kendal, Knockpatrick, Newport, on one or more occasions.

His observations as result of these visits are:—

1. *Pastures.*—(a) Pastures in general are merely bushed periodically, receive no cultivation or fertilizers, are overstocked and not judicially grazed, and consequently are deteriorating, especially by the dying out of the better fodder grasses which are supplanted by inferior grasses or useless weeds and bush.

(b) Wynne grass (Melinis minutiflora) is being successfully and increasingly established for pasture on the higher lands of the parish, whilst Guinea Grass (Panicum maximum) does not thrive well or stand feeding in northern Manchester unless it is cultivated or carefully grazed. It takes about 24-30 months to establish Wynne grass as pasture for grazing from the seeding time. If fed before well established and heavily matted, it is liable to be killed.

2. *Cattle.*—(a) That the cattle, except in a few pens, are of no definite breed or type which indicates a lack of a definite breeding policy.

(b) That they in general show lack of type and slow maturity, which he attributes mainly to lack of good breeding, a low scale of nutrition in their early years, because the pastures are deficient in minerals and nutritive grasses, and possibly also to various forms of parasitism.

(c) This deficiency in growth and development is most marked in dairy groups where the calves are pail-reared or the dams are milked for milk or butter production, and the calves allowed during or after the milking operations a mere pittance of milk daily (a procedure known as milking cows with calves; the calves being penned without food in most cases 12–18 hours before their dams are milked in the morning usually); also in young stock generally on pasture between 12–36 months.

(d) That small settlers' (peasants') cattle are usually of no breed type( scrubs or mongrels), although many of the peasants have had for years ready access to the bulls at the Grove Place Stud. In some cases where improved animals resulted from the stud bulls at Grove Place, the peasant instead of keeping them for the improvement of his own cattle has sold them out.

3. *Sheep.*—That sheep of mixed breeds in flocks of approximately 30, 90 and 150 respectively are kept at three places visited.

In general they are undersized and leggy.

4. *Goats.*—That goats are very generally kept by the peasants in the districts visited. They are used for household milk and butchered or sold for meat (goat's mutton).

The general type of animal is fair to good, which, in view of the general indiscrimination practised in breeding, indicates the definite adaptability of the goat to these districts in Manchester.

5. *Pigs.*—That nearly all the cattle properties (pens) keep a few pigs which range the pastures and thereby obtain feed in the form of herbage, earth-worms, berries, fallen fruit, etc., and receive but little artificial feeding in most cases. Such animals are in general deficient in growth and weight for age.

Most of the peasants keep pigs on their holdings in sties or in enclosures of 60–100 square feet in their permanent crop patches of coffee and citrus, etc. They are fed the waste herbage and products from their cultivations, vegetable peelings and fattened on maize and vegetable tubers. In general they are of mixed breeding, are slow in maturing, but fatten well and find ready sale. The imported Berkshire boars and sows of Grove Place Stud have definitely made an impression and improvement of the swine in the districts.

II. *Dairy Project at Grove Place.*

During the months under review he managed ("broke-in") between 35 and 40 cows specifically for dairy purposes. Of this number 10 were rejected after trial as unprofitable dairy animals—seven due to low production and three as untractable animals.

In this connection he has been studying—

(a) the most economical ratio of concentrates obtainable in the Island (both native products, chiefly maize and coconut meal, and imported products, such as cottonseed meal and wheat bran) for milk production.

(b) the relative value of different kinds of pasture grasses for milk yield.

(c) the cost and rate of growth and weight (maturity) of heifer calves in connection with pail-rearing of calves.

(d) the cost of butter production under Grove Place conditions.

III. *Veterinary assistance.*

1. Diagnosed blackleg of cattle on three properties, by physical and post mortem examination.
2. Administered prophylactic vaccination for
   (i) Blackleg—191 cattle at the three above places and one other property.
   (ii) Anthrax at Litchfield—77 cattle—merely as a precautionary method.
3. Castrated 14 bulkins on some of the large properties and small settlers' holdings with the Burdizzio emasculator.
4. Tested the dipping fluid and supervised the dipping of cattle—three or four times at Brumalia, Lyndhurst and Richmond Hill, and urged the small settlers adjacent to Grove Place to regularly dip their cattle for tick control at the Public Dipping Tank at Grove Place.

IV. *Educational Work.*

Lectures were given on livestock subjects at Branch Meetings of Jamaica Agricultural Society, at

1. Devon
2. Ebenezer
3. Mile Gully
4. Mizpah near Walderston
5. Newport
6. Dairymen's Association, Mandeville.

(Signed) S. Lockett,
Senior Veterinary Officer
15th March, 1938.

*Report on American Foul Brood Disease of Bees* 1937.

1. Governmental supervision of this third occurrence of American Foul Brood in the Island (officially dated as of November 13, 1934) was maintained throughout the year.

2. The good results attending the control measures of 1935 and 1936 continued throughout 1937 until June 15th when a previously unknown and unregistered apiary at 27 Slipe Road, Kingston, was discovered to be infected. Except for this single apiary there was no recurrent infection found or reported in Kingston and St. Andrew during the entire year.

No infection has so far been reported or found outside Kingston and St. Andrew.

3. Registration of apiaries in area of Kingston and St. Andrew—

| As of 1.1.37 | As of 31.12.37. |
|---|---|
| 93 apiarists | 98 apiarists |
| 109 apiaries | 119 apiaries |
| 3,370 estimated colonies | 3,657 estimated colonies. |

The actual number of apiarists is constantly changing by reason of sales of apiaries and owners going out of the business. Similarly the number of apiaries fluctuates month by month because of sales and amalgamation of small apiaries and occasional movement of apiaries outside the area.

The number of colonies at any period of the year is very variable because of the natural increase of colonies in the honey season by swarms or artificial increase of colonies. This increase tends to suffer reduction later in the year when colonies die out or grow weak (less populous) due to dearth of nectar—a retrograde tendency which the apiarist frequently offsets by amalgamating two or more weak colonies to make a strong one.

4. Since the beginning of the outbreak of American Foul Brood (officially as of November 13th, 1934) only 16 apiaries have shown infection (14.5% approximately) in Kingston and St. Andrew. Fortunately no infection has been discovered in the parishes outside of that area.

5. Tours of inspection were made by Hy. S. Holt during four periods of 1937:—

(i) March 15–24th when 23 apiaries in the vicinity of previously infected apiaries were inspected including 10 formerly infected ones in the vicinities covered. On this occasion 5 of the 10 apiaries formerly infected with Foul Broos showed a diseased condition of the brood which was reported as Sac Brood. The diagnosis was subsequently confirmed April 15th 17th, when the involved apiaries were again inspected. Fortunately this complication of the situation rapidly disappeared as no trace of it was exhibited in the said or adjacent apiaries when again inspected June 15 July 10th.

(ii) June 15–July 10th, when 44 apiaries chiefly located in vicinity of previously infected foci were inspected and no Foul Brood infection discovered, except in an apiary at 27 Slipe Pen Road, Kingston, on 15.6.37.

This apiary, not having been officially reported for registration, was discovered merely by chance. When inspected it consisted of 7 colonies of which 2 showed infection with American Foul Brood and were promptly burnt.

(iii) September 21st—October 9th, when, 24 apiaries in the same localities were inspected with negative findings for American Foul Brood, except in the apiary at 27 Slipe Pen Road, where 2 more infected colonies (i.e., 2 of the 5 colonies left in the apiary subsequent to inspection June 15th–July 10th—were found and burnt, leaving 3 of the original 7 colonies.

(iv) November 27–30th 1937, specially for (a) final inspection of Jamaica Agricultural Society's apiary before removal from 4 Homestead Road off Windward Road, to the new apiary site on Kingston-Spanish Town Road—result of inspection, no infection. (b) inspection of the 3 remaining exposed colonies at 27 Slipe Pen Road, Kingston. Sometime prior to this date the colonies were sold and illegally removed and up to the end of the year had not been traced.

6. Except for the infection in the apiary at 27 Slipe Pen Road on 15.6.37, and 21.9.37 there was no infection found in apiaries in the Kingston and St. Andrew area since 27.7.36—practically for 18 months ending 31.12.37.

7. During the entire period of the present occurrence of American Foul Brood (the third in the history of beekeeping in Jamaica) i.e., from November 13th, 1934 to December 31st, 1937:—

(i) Only 16 of the 119 apiaries in the area have fallen to infection.

(ii) In 15 of these 16 apiaries all infected colonies were promptly burnt after discovery of their infected state. Only one apiary, viz., apiary of T. A. Gayle, formerly situated at 39 Wellington St., Smith Village, was destroyed totally under Order of the Governor on March 3rd, 1936.

(iii) In the 15 above apiaries, 59 colonies of an original total number of 527 colonies were burnt in control measures, i.e., 11.2% approximately—a cheap and effective method of control when applied in the early period of an apiary's infection.

(iv) In the case of T. A. Gayle's apiary (39 Wellington Street) where infection was well established when first discovered, the burning of infected colonies did not promptly check the extension of infection in the apiary.

Prior to the total destruction of this apiary the burning of 31 of the original 65 colonies had not definitely suppressed recurrent infection in the apiary. This single unsatisfactory result is attributable to two main causes, viz: extensive infection in the apiary when first discovered and subsequent delays in promptly burning infected colonies when discovered.

The rest of the apiary then consisting of 58 colonies including nuclei was destroyed on March 3rd, 1936, under Order of Destruction of February 28th, 1935.

(Signed) S. Lockett,
Senior Veterinary Officer.
15.3.38.

(viii) *Report of Supervising Inspector of Plant Diseases.*

Director of Agriculture.

I beg to submit my report for the year ending 31st December, 1937.

Banana Diseases.

2. Surprise visits and instructions for prompt treatment of infected Panama Disease plants were maintained throughout the Island. Inspectors travelling and altering of itineraries have been increased owing to alarming reports of Leaf Spot Disease, and to the demand for permits to be given after inspection of fields for the supplying of suckers free of Panama Disease. Two acres of S. 19 were planted in areas infected with Panama Disease,—one at Guys Hill and the other at Borobridge. The plot at Borobridge is now producing a fine grade of fruit. On these two areas coffee plants are being established and the S.19 plants serve as first class shade.

3. Investigations were made into the complaints of planters against the use of Gas Oil; the treatment of cases by Inspectors where owners failed to treat the one root and where the nine-root treatment had to be enforced and into supposed "cures" for Panama Disease. A very keen inspection has been kept upon each Inspector's district, special attention being paid to the treatment of neglected cases.

4. The health of the Inspectors remained good for the year and no transfers were made. Inspector McHardy performed his duties in addition to acting as Inspector of Produce for the western parishes.

Inspector Carnegie carried out rigid inspection and cutting down of Bud Rot diseased coconuts from Falmouth to Lucea. Practical cures suggested by planters for Bud Rot disease of Coconuts were carried out, but none so far has given satisfactory results.

5. The Inspector in the parishes of Hanover and Westmoreland carried out his usual duties with rigid inspection of Mosaic Disease. Cultivation of a cane nursery for supplying tops of the latest varieties which were very much in demand, was also executed.

The Inspector for the parish of Portland carried out the duties of Inspector of Citrus Development work and acted as Agricultural Instructor along with his usual duties. He also supervised the Demonstration Plot.

6. A manurial experiment on coconuts was conducted by the Agricultural Chemist with the assistance of Inspector Carnegie, but no definite results are yet available.

7. Inspector Thomson carried out spraying experiments on Leaf Spot.

8. Three acres were given by the Lands Department for the demonstration plot at Chepstowe. The land was cleared and all leaves and rubbish were stacked for manure—without the usual practice of burning bush. A house of two apartments with a 4 ft. verandah was erected. A kitchen, latrine, cow shed, goat house and rabbit hutch were also erected. The area was fenced and planted around with timber and match wood (*Simaruba Glauca*—Bitter Damsel). The following plots were laid out:—Citrus, pine, sweet potato, cassava, Guatemala grass, Uba cane, cocoa, coffee, tobacco, ginger, banana, varieties of yams, vegetables, economic fruits such as pears and breadfruit, etc., etc. The complete cost for establishment of this plot with house was £58—£32 for house and £26 for layout of cultivation. A fine heifer was given by the Hope Stock Farm. This animal is in fine condition and will be calving soon. Manure from rabbits, goats and cows is being collected for use on the plot.

Citrus.

9. The citrus nurseries established at Caymanas and Tamarinds have been carried through but not with as fast a growth as was expected. The Caymanas Nursery can now supply 7,000 budded plants. The Prison nurseries, cultivated by prisoners and budded by apprentices can now supply 26,000, thus totalling 33,000 plants. The total amount of budded plants distributed for the past four years from these two nurseries under my supervision has reached a grand total of 103,000. A reserve of 100 plants of each variety imported is kept for the free supply of budwood throughout the island. 500 quarts of sour orange seeds have been sown in two nurseries for furtherance of this campaign. Every Inspector of Plant Diseases assisted in the layout of citrus plants supplied and spraying was done free of cost for small planters by the Agricultural Officer and the local Inspectors.

10. In August the Lands Department gave 30 acres under bananas on the Charlton Land Settlement for nursery work. The very old banana plantation was dug down and all large banana suckers were supplied to immediate buyers at 10/- per 100. Every banana sucker was replanted after 10 acres were ploughed and harrowed. There are now established in this nursery 27,000 banana plants free of Panama Disease. 20,000 sour orange seedlings are growing for budding purposes.

10,000 cocoa plants are growing in bamboo pots.
50,000 coffee plants.
30,000 annatto plants.
1,500 Avocado plants.
1,700 coconut plants.
1 acre of best varieties of canes.
½ acre of cassava.
½ acre potatoes.
1 acre Guatemala grass.

Purchasers of land on this settlement will be supplied plants at nominal rates and free in many cases.

11. *Mangoes.*—The mango budding campaign on the Liguanea Plains continued during the year. The two assistants were fully occupied in top-working all the cut-back trees. This campaign was carried through from August 1936 to December 1937. The position is as follows:—

| | No. of trees budded. | No. of buds growing. |
|---|---|---|
| Aug. to Dec. 1936 .. | 1,480 | 3,057 |
| Jan. to Dec. 1937 .. | 2,304 | 10,916 |
| Total for 16 months | 3,784 | 13,973 |

A severe attack of Thrips was experienced but was controlled by spraying with 2% solution of Mortegg. As there are now only a few trees remaining which are not budded, it is expected that one of the assistants will be taken off this campaign.

12. *Avocado Pears.*—The following variety of Avocado pears from Florida and Guatemala are now growing into bearing trees:—Simmonds, Trapp, Pollack, Gottfried, Linda, Collinred and Winslowson.

Some fifty plants have been taken from these and are now planted out in orchard form at Charlton.

13. *Smooth Cayenne Pines.*—This variety of pineapples was imported and planted in December 1935. Some 500 plants survived after rigid inspection and fumigation. The attack of Mealy Bug was very severe on the plants and several succumbed to Wilt. Very large fruit was reaped but the flavour was not up to the high standard of our other pineapple varieties. 250 plants of this Cayenne variety have been transferred to Charlton where it is hoped the Mealy Bug may do less harm.

J. B. Sutherland,
Supervising Inspector of Plant Diseases.

(ix) *Report of Agricultural Officer.*

6th April, 1938.

Director of Agriculture,

I have the honour to submit my report for the year ending 31st December, 1937. The duties devloving upon me have continued to be linked primarily with the propaganda in the extension of citrus planting throughout the Island.

A.—Field Work.

1. The special effort launched by the Government subsequent to 1933 in the citrus development in all parts of the Island has resulted in approximately 900 additional acres being planted, possibly 60% of which should be yielding reasonable supplies of shippable fruit of Marsh Grapefruit and Valencia Orange. By frequent visits and correspondence the Department has succeeded in sustaining the interest formerly aroused by the visits of its officers to individuals, and also in maintaining most groves up to a fair standard.

2. With this object in view an endeavour has been made during this year—not altogether without a good measure of prosperity—to secure a rest period during the so-called winter months during which practically none of the specific work is prosecuted (e.g., spraying, pruning, etc.) while as a sequel to this passivity and incidental to the awakening of the plants, the scales and the soil, is urged a mobilization of all our forces for agressive action-pruning, spraying (twice in quick succession), soil culture, artificial fertilising and crop interplanting all having due regard to the local requirements. There is no field containing over 50 plants in any part of the island, other than three in Upper St. James visited by Mr. Sutherland, that has not received my personal attention at least once during the year, and the majority of those in Manchester, St. Ann and eastward of these parishes have been similarly afflicted on more than one occasion.

3. Response to the recommendations of the Department on the part of the growers and fidelity to its principles in citrus culture are invariably characterised by unquestionable advancement. Outstanding instances of neglect of this coherence are to be seen in the lack of development or, in extreme cases, of the complete collapse, of the groves. Unfortunately there are some who either possess fixed and determined ideas of their own, and in consequence cannot be otherwise impressed, while another class, after discussing certain measures with prominent persons, decides upon plans of action without further consultation with Departmental officers, both of which movements invariably have a disastrous conclusion. The only heavy fatalities of plants, with the eminent exception of one case of serious flood damage soon after the planting, are to be found among the two classes. One is gratified at the collaboration of the very great majority of growers both large and small and that the lack of cohesion is the exception and not the rule.

4. While it was not anticipated that a saleable crop would be forthcoming during the third year of field growth, many have had the pleasure of receiving small returns from the sales of "Marsh" Grapefruit from these young fields, and in one grove of "Thompson Pink"—the pink Marsh. On the other hand there is hardly any planter of a year or more who has not tasted fruit from his own trees. My own impression of the class of fruit is that some of it, despite the factor of the youth and vigour of the trees, is already shipping fruit of good shape and quality. If allowed to mature thoroughly the "Marsh" as we grow it is of excellent texture, good flavour with little of the harsh bitter flavour and uniformly overburdened with juice. At an immature stage, though never lacking in juice content, it sometimes is extremely bitter and this characteristic has been unjustly emphasized.

5. With every desire to show an open and impartial mind as to the progress in the parishes, one would still give the palm to St. Mary, where, as previously reported, this work was initiated. Having due regard to the fact that it was generally hyphothesized in this parish that citrus could not be grown at all owing to the heavy rainfall and the colloidal nature of its soil for considerable depth, the progress of groves with practically no serious set-backs is indeed encouraging, and, I presume, remarkable. Growers at the offset who agreed to make a small start with 70 plants (or 1 acre) have, without any pressure being brought to bear upon them, extended to 200 in the case of a smaller man and to over 300 in that of the larger banana planter. Both of these have also used their own plants for further expansion, indicating in unmistakable terms, at any rate an increase, or substantiation of their faith in the venture.

6. There are trees here which can in open competition with the best in any other parish make a very fair showing. In addition to this it should be placed on permanent record that although some are now in their fourth year no serious case of collar-rot, or similar gum troubles, has yet appeared, though it has been found in other parishes. The largest citrus cultivation is on soil which, because of its heavy nature, no self-respecting banana planter would select for his crop. To this objectionable feature is added a rainfall of undue proportions lasting almost throughout the year. The unquestionable success of plants up to the present is regarded as an inspiration and ominous as to the future. We are led to attribute some of this progress first to the good start given to the plants by the building of mounds high above normal ground level and 8 ft. across admitting of thorough draining during the first year, which, in addition to the well cultivated soil, induced a well established root growth from the offset—the great essential to early success in heavy lands. To this must be added the control of weed development sufficiently to secure a clean bank at all times and treatment for scale insects and slugs. It is also conceded that artificial manures do add considerably to such an achievement. In the second to third years drainage by trenching has been found to be necessary though the lands are hilly. As a principle every effort is being made to anticipate trouble and to formulate plans for preventive measures. Many of the groves in this parish produced good fruit some of which was sold for export.

7. Manchester and Clarendon, especially around Mocho, being recognised as good areas, do not create quite so great a sensation. The desire for extension previously reported has been somewhat checked only by lack of plants. Mocho however has now approximately 115 acres established under the Loan Scheme and under our care otherwise.

8. In St. Ann I do not consider this year's progress is as satisfactory as in previous years, though the parish was liberally treated as to instruction and demonstrations with the assistance of Inspectors of Plant Diseases and Agricultural Instructors.

9. St. Thomas has hardly taken citrus seriously and seeing that bananas are not at present fatally challenged by disease, and coconut interplanting is the generally recognised practice, no room is made for the introduction of any other crop. Such groves as are in existence are being maintained.

10. In the west end only St. James has taken advantage of the Loan Scheme and two five-acre plots are to be found there There is also one large planter doing approximately 20 acres on his own. Smaller lots of plants have been distributed throughout that parish and the others adjacent to it. Numbers are in fair order, and growth in some cases is satisfactory. Inspectors of Plant Diseases and Agricultural Instructors have very largely contributed to the planting and care of these plants.

12. *Pests.*—Insect pests are not exercising any serious influence against the advancement of the plots. It is quite customary to find most growers willing and ready to provide themselves with the requisite material for use against scale insects, and obvious signs of advancement in pest control are to be observed in most places, due doubtless to the continuous instruction over a period of years and guidance as to the use of insecticides.

The plan of attack followed by me is one suggested by the Government Entomologist about two years ago, which appears to serve the purpose. It evolves a general spring spraying incidental to the first flush after the normal period of dormancy, repeated three weeks later; then inspection and local spraying as indicated for three to four Months or whenever the spread is general. Another general clean up as at the start should be required prior to normal wintering, say from September to October. Spraying is discontinued entirely when natural control agencies are active say from November to March, the limits varying according to location. The grub of the Fiddler Bug (Prepodes vittatus) which has been responsible for some loss in the past, this year claimed very few plants. The Government Entomologist being good enough to let me into some of the secrets of his address to the Summer Course on this subject in advance of the time, I was therefore able to make a rapid circuit of many of the groves under the aegis of the Department and to get some of our growers moving in June, before the laying stage had very considerably advanced. It might be well to state that apparently a large section of the public expects to effect relief by digging for the grubs in the earth. Such a practice cannot be too emphatically deprecated. Firstly the capture of the grub is problematic, and usually takes place after the worst of his damage is completed. Secondly, the root damage is invariably very severe and not compensated by the results.

13. The losses by slugs in young groves have been very serious, but proper trapping and sometimes spraying associated with tin guards for plants repeatedly attacked have proved beneficial. As a rule the plants of the sluggard suffer most from this pest.

### B.—Interplanting.

13. The customary ground provision crops have been grown as reported on previous occasions. The introduction of bananas in any plot immediately results in good agricultural conditions prevailing—e.g., forking and drainage in heavy lands and good rainfall areas, and in irrigation or mulching where requisite. Without an allowance of this crop no such tillage may usually be anticipated. Again it is gratifying to mention that potatoes have been grown on the citrus plots with extraordinary profits and to the specific benefit also of the permanent crop. This feature is not peculiar to any particular type of soil but is equally true in the sections possessing clays and with good rainfall as in the white limestone red soils.

14. The tenant system has been continued for the season, and the general rule is that failure is manifest only where the owner is himself indifferent. The tenants are very largely under the control of the officers of this Department.

### C.—Demonstration Plots.

15. The plots at Islington and Highgate, both in St. Mary, are proving to be useful in many ways, educationally and experimentally.

16. At Berrydale near Fellowship in Portland the Rio Grande in the floods in October swept away many of the trees and left deposits of debris lodged against the remainder which apparently, associated with the ringing caused by the violence of the waters, has set up gumming. The owner is grossly indifferent to his own interests and does not bestir himself in any way. Most of the work of maintenance has been executed by the Department and, in the present case, in the face of profuse promises he still continues to be lethargic.

17. At Llandewey (St. Thomas) the growth in one section is encouraging, but here banana shade is an objectionable feature, and one half of the plants are consequently undersized. But for this there should be a reasonable fruiting in the present year.

### D.—Citrus Development Loan Scheme.

18. The Scheme has continued to grow and extension has been delayed only by lack of plant supplies. Practically all the properties receiving loans are acting under the direction of this Department and the groves are in reasonable order.

### E.—Distribution of Plants.

19. The distribution of plants totals only 2,703 which comprises the last planting from the old nursery. From the new nursery only 100 plants have been sent out and these are rather on the small side.

### F.—Meetings.

20. The meetings attended were the Staff Conference held at the Farm School on the 5th of February, Tobacco Station, Low Temperature Station, etc., on the 6th February, on the 30th April the Annual Meeeing of the Vegetable Growers at Bull Savannah, the Half-yearly Meeting of the Port Antonio Branches Associated on the 12th June, Craighton Branch of the Jamaica Agricultural Society on the 16th October. I also attended the Summer Course lasting from the 19th to 24th July.

### G.—Miscellaneous.

21. Being required to report on Rice I visited Westmoreland and Hanover on two occasions, and also Vere.

23. I reported on Land Settlement—five properties for land settlement and one for a Vocational School.

24. The report would not be complete without an extension of thanks to the staff of the St. Catherine District Prisons for willing assistance in the nurseries.

L. L. Carrington,
Agricultural Officer.

*Distribution of Varieties.*

| | |
|---|---|
| Grapefruit: | |
| Marsh Seedless | 8 |
| Davis Seedless | 6 |
| Orange: | |
| Valencia, Isleworth | 2,505 |
| Valencia, Reasoner | 34 |
| Lue Gim Gong | 149 |
| Surprise Navel | 1 |
| | 2,703 |

*Distribution in Parishes.*

| | |
|---|---|
| St. Mary | 45 |
| Manchester | 300 |
| St. Catherine | 317 |
| Clarendon | 1,222 |
| Portland | 375 |
| St. Andrew | 61 |
| St. Ann | 200 |
| St. James | 175 |
| St. Thomas | .. |
| Trelawny | .. |
| St. Elizabeth | .. |
| Westmoreland | .. |
| Hanover | .. |
| Kingston | 8 |
| | 2,703 |

Of this total 106 are supplies for dead or unthrifty plants.

(x) *Report of Tobacco Specialist*, 1937.

*Registered Growers*, 1936. —Many of the registered growers were not able to finish planting by the end of 1936, so the few showers of rain in January helped them to plant out the remaining portions of their fields. One or two could not finish even then as they had no suckers. In March, the new Government Tobacco Station was opened and the tobacco began coming in. By July all the crop had been delivered, and a certain number of outside growers had also sent in their crop for handling and export. 55,722 lbs. nett weight was the total delivered to the Tobacco Station from the 1936 crop. As soon as sufficient tobacco had been received staples were built up according to districts. These were allowed to ferment, and were turned, so that all tobacco received sufficient fermentation. Then as the staples became ready for grading and sorting, the bundles were opened, treated and given out further treatment. An average of 50 women were daily employed from the beginning of March to the middle of October. The total number of working days being 11,708. The grading and measuring was at first slow, as nearly all the women were new to the work, but in time they were able to work faster and neater. For the 1936 crop there were 15 grades. The Binders were sorted into 2 quality grades, and measured into 3 length grades each quality. The Fillers were also sorted into 2 quality grades, and 4 length grades for the first quality, and 5 length grades for the second quality. After the grading and measuring the tobacco had to be re-fermented thoroughly, until dried out enough for packing and shipment. A certain quantity of the shorter grades were sentas "stripped" leaf, that is, the midrib of the leaf was taken out, so that the "strip" could be used straight away for the manufacture of cigars. This form of tobacco naturally fetched a higher price than the unstripped form. The shipments were made according to districts, and the cases were marked to show from which district the contents came. In all 177 cases were shipped with a nett weight of 49,146 lbs. The remnants or damaged leaves, called "fonque," were sold locally It was found that the tobacco produced in Clarendon turned out far the best. Though the St. Andrew tobacco was good in quality, the yield per acre was very poor. Without doubt the soil along the Minho River, and the smaller rivers of Upper Clarendon is by far the most suitable for tobacco growing, mainly because during the floods the soil is renewed, whereas in St. Andrew, at such places as Cherry Garden, Constant Spring and Golden Spring, where the same land has been planted year after year, the soil is worn out and little has been done to strengthen it.

2. *Experimental Plots.*—The tobacco produced from the three experimental plots varied very much. The Puerto Rican types, Havana and Cuban types and the Sumatra type were all good, and after fermentation it was easy to see which types were most suitable. The yield per acre was good, except at Cherry Garden. The yields were as follows:—Temple Hall 1,400 lbs. per acre, Hope 1,100 lbs. per acre, Cherry Garden 450 lbs. per acre, and the average worked out at a little over 900 lbs. per acre. Seed was collected for distribution, and 250 packets were sold at a resonable price to growers in many parts of the island. A number of fertilizers were tried out and it is evident that any fertilizers containing muriate of potash must not be used for tobacco, as the burning qualities are impaired.

3. The 1937 crop was started in September, the land having been already prepared in July and August. The Cherry Garden plot was given up and a better plot of land taken at Constant Spring. The plots at Hope and Temple Hall were again used, though at Hope new land was used for the nurseries. The same methods of preparing seedbeds were again used, but the fertilizer was altered to a 5 x 10 x 10 mixture. In total 258 beds were prepared, and 3 types of seed used. Of the Puerto Rican type, the UX,S-30, and V-9 were used, one type of Sumatra was used, and 3 types of Havana, AV,M and B. A trial bed of Manilla seed gave poor results. Later in the season some Virginia seed was tried, and the results were fairly good.

Over 100,000 suckers were sold to growers and many were given away. It is hoped that from these plants seed will be collected for use next year. The nurseries in spite of heavy rainfall in October and November did well and with the exception of fungus diseases here and there, which attacked a few beds at Temple Hall, no serious losses occurred. The planting began on September 21st and the method of moulding prevented the heavy rain doing much damage. The first acre planted with Havana types produced some very fine tobacco, the Puerto Rican types were not so good this year, UX being the best.

The first planted Sumatra did well and some very thin leaves, which will turn out as binder-wrapper, were produced. The last planting in December was not so good, as the drought set in. It is necessary on the southside of the island to start planting in the last half of September and finish before the end of November. So many planters have trouble with their seedbeds, that they can never start at the right time, and finish too late, when the drought sets in and there is no hope of producing a good crop. This year the rainfall was heavy and continuous during October and November, so it was difficult to keep the

harvested tobacco sound in the drying barns, and charcoal fires had to be used day and night. The experimental crop this year will not be as large as last year, though for quality it is better. The experiments with Virginia tobacco were tried on numerous plots of one square chain each. There are three plots in St. Andrew, 3 in Clarendon, 2 in Manchester, 1 in St. St. Elizabeth and 1 in St. Catherine. It has not yet been ascertained which plot has produced the best Virginia. What has already been flue-cured shows that Virginia can be produced here.

Several manurial and plant-spacing tests were made this year. The results of the fertilizer tests cannot yet be determined, but the plant-spacing tests have shown that the double row system for Havana tobacco is the best, that is, the rows are set out at 36 ins. and 20 ins. in one direction and the plants are spaced along the rows at 18 ins. distance and staggered, so that no two plants come opposite to each other. Even the Puerto Rican types seem to do better in the double row, though the spacing for these plants should be a little wider. Seed was again collected from the best plants. More Havana type was collected, as the local grower understands this type of plant better, and as they are not used to priming the leaves. The usual method is to cut the whole plant when the top leaves are almost ripe. The experiment at Lititz was a failure, as the planting was begun too late, and only one shower of rain came from the start to the finish. Only half of this small plot was planted out. The first planted Havana came up fairly well, but was ruined by heavy wind and insect pests.

4. *Registered Growers* 1937.—For the 1937 season 39 growers contracted to plant 265 acres, but after a short time 2 growers fell out and repaid what they had borrowed. There remained then 37 registered growers with an acreage of 250 acres. Of these growers 14 were in Lower Clarendon on excellent land along the Minho River, 11 were situated in Upper Clarendon on good land, which had been rested a number of years, 8 were in St. Catherine at Colbeck, an old tobacco area consisting of good alluvial soil, and 4 were planting on good land at Constant Spring. The majority of the Lower Clarendon growers had been moved from St. Andrew to a fine piece of land at Woodleigh, and these growers were helped very considerably, financially, by the Government, so were enabled to clear the lands of heavy undergrowth and trees, and build themselves the necessary tobacco barns. Much trouble was experienced by all growers this year in producing suckers. First in September there was a drought, which burned up all the 'bush-nurseries,' as no one thinks of watering a bush-nursery. Then the later beds were washed away by the heavy rains of October and November. The few growers, who were lucky enough to have suckers, did a good trade selling suckers to the less fortunate ones. The crop, which has resulted from these suckers, has turned out better than I at first imagined. There is much more Havana planted this year, so the better grades ought to be more than last year.

Nearly all the growers have over half of their plantations planted out with Havana instead of the local Cuban type, and the first half of their crop looks good. If sufficient rain is forthcoming the whole crop should be better than last year. The Constant Spring growers have the worst fields. They have had trouble with hiring steers for ploughing, so all cultivating was late, then they had no suckers and had difficulty in buying suckers. Next year it might be better to give up all these growers. The Lucky Valley growers have some very fine tobacco, but their last planted fields will not come to much unless they have a shower or two of rain. From all the seed I gave out only two planters have been able to produce any really good seedbeds. The others, through their haphazard methods, have lost all their young suckers from this seed. The planters would much rather buy suckers from the experimental plots than seeds; however, though more seedbeds will be laid down next year, seed will still be given out, as the growers must learn how to produce suckers themselves in spite of adverse weather conditions.

5. *Independent Growers and Exporters.*—For the 1936 crop there were only 20 independent growers who sent their tobacco to be handled at the new Tobacco Station. All exporters had to send their tobacco to be examined before shipment according to the new Tobacco Regulations. The number of these exporters was four, and the amounts exported were very small. 3,707 lbs. were sent to the United Kingdom, and 1,000 lbs. to Bermuda. There will be another shipment made shortly of about 6,000 lbs., but the tobacco is not dry enough. The exporters have improved their methods of grading and packing already, and it is hoped that by next year all exporters will be able to grade properly, and that all tobacco sent for examination can be passed. The moisture content has caused much trouble, and it is very difficult to bring down the moisture content to the requirements of the Home market, that is, to 12–14%.

6. *Government Tobacco Station.*—Further plans for extending the Tobacco Station were approved, work began on these extensions in November, and will be completed early in the New Year. The new building will be capable of holding 150,000 lbs. of tobacco. The existing buildings were improved, the grading shed being better ventilated and made less dark by opening up more windows, also a material shed was added. The grounds round the buildings were planted with grass, a few flowerbeds were laid out, and the roadway was asphalted, which almost entirely eliminated dust which had hindered us greatly last year.

7. From what has already been sold an average price of a little more than 1/- per lb. c.i.f. was made, leaving an average of 8d. a lb. over for the growers, as the working costs of the Tobacco Station will be about 4d. a lb., including all packing and shipment charges. The growers will have to produce a larger percentage of fine binder leaf, if they hope to raise the price. However, as 8d. a lb. is quite a high average price for the filler types of tobacco, they ought not to complain.

8. *Miscellaneous.*—Correspondence during the year was considerable, and many circulars were sent out to interested parties. Two more circulars were published during the year in the Jamaica Agricultural Society's Journal. This completed the set of 5 circulars which deal with all stages of tobacco growing of the cigar types, as follows:—Seedbeds, Cultivation, Planting and Care of Plantation, Tobacco Curing and Tobacco Diseases and Pests. Quite a number of new planters have started this year, and some of them have very good crops standing. I and my assistants have had to do a great deal of travelling this year in order to give advice and see that everything was going on in the proper manner. It is interesting to note that the new planters have throughout followed my advice far better than the old-established planters who are difficult to convince.

F. W. Winckley,
Tobacco Specialist.
1st February, 1938.

(xi) *Report of Chief Inspector of Produce.*

Office Inspectors of Produce, Public Buildings, Kingston,
February 18, 1938.

Hon. A. C. Barnes, C.M.G.,
Director of Agriculture,
Hope, Kingston.

Sir,

I have the honour to submit a report on the work of the Produce Inspection Division of the Department of Agriculture for the year ending December, 1937.

The activities of this Division extend in many directions and it would be easiest, perhaps, to mention briefly these under minor heads.

1. *The Produce Law, additions to its Schedules.*—During the year under Schedule 6 additions were made in respect to Vegetables and Fruit, covering all Vegetables and Fruits exported from the Island by packing houses either controlled by the Low Temperature and Marketing Station or packed at this Station. The Citrus Regulations were also amended in respect to the requirements of citrus packing houses. It is stipulated in these amendments that all packing houses shall be mechanically equipped for the necessary processing of fruit, and shippers must first obtain a certificate of inspection from an Inspector of Produce before shipment.

It is recommended by the Lime Growers' Association that these requirements in respect of Oranges and Grapefruit should also apply to Limes and Tangerines. The Produce Board supports this, and have made suitable recommendations to the Government on the matter.

2. *Revenue from Licenses under the Produce Law.*—I would draw your attention to the drop in revenue under the Produce Law resultant on the reduction of the cost of a produce license from £5 to £2 10s. In the financial year 1935-36 before the reduction, there was collected for Produce Licenses £7,086 5s. as against £5,598 5s. for 1936-37 and £5,135 5s. for 1937-38(up to November 30th, 1937). These figures show a decrease of nearly £2,000 per annum.

3. *Produce under Classes* 1 *and* 2 (*Bananas, Citrus, etc.*)—*Bananas.*—The year constitutes a record in our banana export of nearly 27,000,000 stems, in spite of the fact that there was a demand by the shipping companies for a better grade of fruit than that taken in previous years. Observations made by the Inspectors of Produce in respect to the planting of additional areas in bananas pointed definitely to an increase in this figure in the coming year. It is to be regretted that due to unforeseen circumstances this will not be realized.

The satisfactory results obtained by the Produce Inspectors in past years in the elimination of poor, bruised, damaged and otherwise unmarketable fruit has been maintained. This has had marked effect on the quality of fruit exported by the Companies operating in the Island. It is admitted that this work has saved both the growers and companies dealing in bananas a very substantial sum of money.

We have had six cases in which the Produce Inspectors have arbitrated in respect of bananas between the companies operating or between contractors and their company. I understand that this work by the Inspectors in this direction has been generally satisfactory.

*Citrus.*—Our citrus exports to date have been disappointing, only amounting to 265,000 boxes while that of last year amounted to 453,000. This condition is undoubtedly due to the glutted markets in in Canada and England. To the credit of both the Canadian Steamship and the Jamaica Direct Line Companies reduced freight rates were instituted in order to meet the situation. It is to be regretted that market prices, however, were so low that exporters were not able to take full advantage of these reduced rates.

Our New Zealand shipments have also been disappointing, there being a drop in our quantities to New Zealand of nearly 40%. There have been two contributing causes of this (a) the lifting of the embargo by New Zealand on the importation of citrus fruit, Australia taking advantage of this, and (b) the difficulty of obtaining freight space for shipments from Jamaica. It is gratifying to note, however, that reports received from New Zealand on the condition of our shipments have been most satisfactory, and further, repeat orders for largely increased quantities have reached the Island from importers in New Zealand for the coming crop.

*Pimento, Cocoa, Coffee, Annatto and Ginger* have received special attention during the year by Inspectors, our efforts being directed towards better curing, better grading and a better packed product. There are roughly 1,000 produce dealers in the Island buying and selling our products. Premises, books and produce of these dealers have been inspected at frequent intervals by Inspectors of Produce. This inspection work is of great value, in that it keeps to a high standard the quality of produce purchased and sold.

4. *Court cases and destruction of produce.*—There were 32 cases tried in the Courts under the Produce Law during the year, the Produce Inspectors prosecuting, as compared with 30 in the previous year. 21 of these cases were brought against parties who bruised bananas in transit and fines of £21 2s. 6d. were inflicted.

I am pleased to report Inspectors have destroyed but little produce during the year as being unfit for export, but have ordered the reconditioning of several lots before shipment. The following list shows the amount of produce destroyed by the Inspectors, or ordered to be reconditioned under their supervision during the year, and that allowed for local use, but not for exportation:—

| Produce. | Destroyed. | Reconditioned. | For Local use. |
|---|---|---|---|
| Bananas | .. | .. | 44,398 stems |
| Citrus Fruit | 654¼ boxes | 5,509 boxes | 749¾ boxes |
| Coffee .. | ¼ box | .. | .. |
| Cocoa | 20½ bags | 6½ bags | .. |
| Pimento | ⅓ bags | 15 " | .. |
| Annatto .. | 45 bags | 4 " | .. |
| Ginger .. | .. | 11 " | .. |
| Honey | 1 cask | 114 casks | .. |
| Orange Oil .. | 10½ pints | .. | .. |

It will be noticed that 654 boxes of citrus were destroyed. This was fruit gathered so young as to be totally unfit for consumption, while on the other hand 5,509 cases were stopped to be reconditioned and subsequently passed for shipment.

5. *The Produce Board.*—The Produce Board, under Chairmanship of Sir Alfred D'Costa, Kt., met on seven occasions during the year, when matters pertaining to the control of our agricultural exports were discussed and directed in so far as such control comes within the scope of the Produce Board.

The export of citrus fruit to New Zealand was quoted by the Board among the shippers on a basis of a total export of 55,000 cases, allotments only being made to shippers who could show that they had made suitable arrangements for packing, refrigeration and satisfactory sale in New Zealand.

The personel of the Board has been changed during the year, Mr. J. G. Keiffer, Mr. G. G. R. Sharp, Mr. A. F. Thelwell and the Marketing and Development Officer having been nominated by the Governor as members of the Board, Messrs Wint, Keeling and Baxter having resigned.

6. *The Staff.*—The staff of this Division consists of the following members:—

| | |
|---|---|
| P. W. Murray .. .. | Chief Inspector of Produce. |
| R. C. Somerville | Inspector of Produce. |
| A. M. Douet | Do. |
| H. B. Monteith .. | Do. |
| Ian H. Campbell | Do. |
| C. M. G. Purchas | Do. |
| T. V. Thomson | Do. |
| U. Foster Davis .. | Secretary, Produce Advisory Board. |
| C. Levy .. | Typist and Stenographer. |
| R. Waugh. | Messenger. |

Messrs. N. R. McHardy and J. M. McEwen, Agricultural Officers, acted as Inspectors of Produce during the absence of Messrs Campbell and Thomson, Mr. Campbell being on leave, and Mr. Thomson being seconded for work at the Government Low Temperature and Marketing Station.

Leave was granted to the following members of the Staff during the year:—

| Officer. | Sick Leave. | Dept. Leave. | Vacation Leave |
|---|---|---|---|
| P. W. Murray. | — | 7 days | — |
| R. C. Somerville | 3 days | 11 " | — |
| A. M. Douet. | — | 4 " | — |
| H. B. Monteith. | 19 days | 3 " | 2 months |
| Ian H. Campbell | — | 2 " | 3 " |
| C. M. G. Purchas | — | 11 " | — |
| T. V. Thomson | — | — | — |
| U. E. Foster Davis | 9 days | 12 days | 5 weeks |
| C. D. Levy. | 4 " | 13 " | — |

I have the honour to be,
Sir,
Your obedient Servant,

P. W. Murray,
Chief Inspector of Produce.

## C.—RESEARCH AND LABORATORIES.

### (*xii*) *Report of the Deputy Island Chemist.*

The total number of samples analysed during the year ended 31st December, 1937, was 4,941, and compares with former years as under:—

| 1933. | 1934. | 1935. | 1936. | 1937. |
|---|---|---|---|---|
| 3,905 | 3,639 | 3,895 | 4,698 | 4,941 |

The samples are classified as follows:—

"A." Official Samples.

| | |
|---|---|
| (1) *Police, Criminal and Toxicological—* | |
| Human Viscera and Organs .. .. .. .. | 121 |
| Stomach Washings and Vomits .. .. .. | 6 |
| Animal Viscera .. .. .. .. .. | 3 |
| Substances and Articles examined for Poison .. .. | 98 |
| Exhibits in Murder Cases: | |
| Revolvers 3, Pistols 2 .. .. .. | 5 |
| Cartridges 29, Cartridge Cases 5 .. .. .. | 34 |
| Bullets 3, Glass Beads 12 .. .. .. .. | 15 |
| Knives 1, Matchettes 1 .. .. .. .. | 2 |
| Articles of Clothing .. .. .. .. | 6 |
| Exhibits in Obeah Cases, Liquids, Powders, etc. .. .. | 16 |
| Exhibits in Housebreaking and Larceny Cases, Shoes 4, Soils 7 .. | 11 |

| | |
|---|---|
| Miscellaneous Exhibits: | |
| Liquid used for maiming 1, Clothing 1, Paper 1, Beeswax 1, Suspected "Horse Dope" 1, Finger Print Powders 3, Alcoholic liquid from the Cayman Islands 1 .. .. .. | 9 |
| Exhibits submitted under various Laws: | |
| *The Food and Drugs Law.* | |
| Castor Oils .. .. .. .. .. | 1 |
| *The Medical Laws.* | |
| Medicines, Herbs, etc., 12, Eye Drops 1, Pills 1 .. | 14 |
| *The Dangerous Drugs Law.* | |
| Opiums .. .. .. .. .. | 14 |
| Opium Exhibits, Pipes, etc. .. .. .. | 300 |
| Ganga .. .. .. .. .. | 1,415 |
| Ganga Exhibits, Pipes, Rags, etc. .. .. .. | 150 |
| Tobacco (examined for Ganga) .. .. .. | 35 |
| *The Coining Laws.* | |
| Coins, Genuine .. .. .. .. | 229 |
| Coins, Counterfeit .. .. .. .. | 271 |
| Currency Notes, Genuine .. .. .. | 4 |
| Counterfeiting Exhibits, Moulds, Metals, etc. .. .. | 187 |
| *The Spirit License Law.* | |
| Rums 55, Whisky 6 .. .. .. .. | 61 |
| Liquids from Illicit Stills .. .. .. | 17 |
| Tumblers .. .. .. .. .. | 4 |
| *The Brewers License Law.* | |
| Liquids for alcoholic content .. .. .. | 11 |
| *The Protection of Birds and Fishes Law.* | |
| Fish 2, Vegetable Barks 1 .. .. .. | 3 |
| Exhibits in Cases of Arson: | |
| Clothing, Burnt residues, Gasolines .. .. .. | 69 |
| "Firing Devices" .. .. .. .. | 2 |
| Total .. | 3,113 |
| (ii) *Customs and Excise Department—* | |
| Absolute Alcohols and Rectified Spirits .. .. .. | 3 |
| Denatured Alcohols and Methylated Spirits .. .. | 29 |
| Alcohol Denaturants .. .. .. .. | 3 |
| Native and other Wines .. .. .. .. | 21 |
| Rums 2, Rum Punches 92 .. .. .. .. | 94 |
| Flavouring Extracts and Essences .. .. .. | 20 |
| Fuel Oils .. .. .. .. .. | 66 |
| Gasolines .. .. .. .. .. | 2 |
| Insecticides 12, Disinfectants 3 Wood Preservatives 3 .. .. | 18 |
| Fabrics, Silks, Artificial Silks, Cottons, etc. .. .. | 121 |
| Food Products: | |
| Biscuits 4, Condensed Milks 1, Caramels 1 .. .. | 6 |
| Miscellaneous: | |
| Drugs 6, Wax 1, Liquid Gases (Cylinders) 1 .. .. | 8 |
| Total .. | 391 |
| (iii) *Department of Science and Agriculture—* | |
| Animal Viscera for Poison .. .. .. .. | 2 |
| Substances, Cotton Swabs, Washes, etc., suspected to be used as "Horse Dopes" .. .. .. .. | 5 |
| ConcentratedCattle Dipping Fluids .. .. .. | 2 |
| Plant Specimens .. .. .. .. .. | 1 |
| Annatto 3, Honey 1 .. .. .. .. | 4 |
| Distillery Products 6, Metal Bearings 2 .. .. .. | 8 |
| Insecticides and Wood Preservatives .. .. .. | 2 |
| Chemicals (Cuprous Oxide) .. .. .. .. | 1 |
| Waters, Potable 1, Distilled 1 .. .. .. | 2 |
| Cornmeals 2, Milks 1 .. .. .. .. | 3 |
| Plasma .. .. .. .. .. | 1 |
| Instruments for Test (Thermometers) .. .. .. | 2 |
| Total .. | 33 |

| | |
|---|---|
| (iv) *Island Medical Department*— | |
| Fresh Milks, Genuine | 5 |
| Do. Adulterated | 5 |
| Waters, Potable 11, Distilled 1 | 12 |
| Sardines | 2 |
| Aerated Waters | 2 |
| Faeces | 1 |
| Total | 27 |
| (v) *Department of Public Works*— | |
| Corns, Native | 85 |
| Diesel Engine Fuses | 1 |
| Total | 86 |
| (vi) *The Jamaica Agricultural Society*— | |
| Cassava tubers | 70 |
| (vii) *The Kingston and St. Andrew Corporation*— | |
| Waters, Potable 1, Boiler Feed 1, Coal Tars 1, Gas Coals 1 | 4 |
| (viii) *The Water and Sewerage Commission* — | |
| Waters, Potable | 2 |
| Total Official Samples | 3,726 |

"B" General Samples.

| | |
|---|---|
| Fresh Milks, Government Stock Farm | 945 |
| Do. Private Producers | 9 |
| Cattle Dipping Fluids | 60 |
| Sugars | 32 |
| Rums | 109 |
| Waters, Potable, and Boiler Feed | 11 |
| Foods and Feeding Stuffs: | |
| Butters 3, Flours 3, Coconut Meals 3, Honey 1, Turmeric Roots 1 | 11 |
| Medicines 2, Herbs 1, Vegetable Extracts 2, Plant Specimens 1, Quassia Chips 1, Ointments 1 | 8 |
| Fabrics, Silks and Cotton 3, Sackings 1 | 4 |
| Encrustations from damaged metals | 7 |
| Ores, Minerals and Deposits | 11 |
| Essential Oils | 1 |
| Gasolines | 1 |
| Chemicals (For $SO_2$ content) | 2 |
| Miscellaneous— | |
| Suspected "Horse Dope" 2, Wood Preservatives 1 | |
| Instruments for Test (Polariscope) 1 | 4 |
| Total General Samples | 1,215 |
| Grand Total | 4,941 |

Official Samples.

The 121 analyses of human viscera and organs, and 6 stomach washings and vomits were made in connection with 71 deaths. In 40 cases positive results were obtained in the viscera, etc., as follows:

*Human Viscera and Organs* (121)—

(1) Arsenic, 0.34 grains and Cresols from the organs of a male adult suicide (Cattle Dip.)
(2) Traces of Saponins from the organs of a female child.
(3) Traces of Saponins from the organs of a female child.
(4) Phosphorus, large traces from the viscera of a male adult.
(5) Phosphorus, large traces from the viscera of a female adult.
(6) Ptomaines, traces of from the organs of a female adult.
(7) Ptomaines, traces of from the organs of a female child.
(8) Alcohol, 10 grains from the stomach of a male adult.
(9) Traces of an alkaloid recembling Veratrine from the viscera of a female child.
(10) Arsenic, large traces from the organs of a female infant.
(11) Arsenic, large traces from the organs of a female child.
(12) Arsenic, large traces from the organs of a male child.
(13) Arsenic, large traces from the organs of a female infant.

(14) Phosphorus, traces from the stomach of a male adult.
(15) Phosphorus, large traces from the organs of a female adult.
(16) Nitrobenzene, 14.5 grains from the stomach and contents of a male suicide.
(17) Hydrocyanic Acid, traces from the stomach of a female adult.
(18) Hydrocyanic Acid, traces from the stomach of a female child.
(19) Arsenic, 0.05 grains and Cresols from the stomach of a female adult suicide (Cattle Dip)
(20) Phosphorus, 0.043 grains from the organs of a male adult.
(21) Phosphorus, 0.06 grains from the organs of a female child.
(22) Arsenic, 37 grains and Cresols 117 grains, from the stomach of a male adult who drank Cattle Dip in mistake for medicine.
(23) Potassium Cyanide, 19 grains from the stomach of a male adult suicide.
(24) Phosphorus, traces from the viscera of a male child.
(25) Arsenic, 0.003 grains from the organs of a male adult.
(26) 0.74 grains of a substance having the properties of a Glucoside from the viscera of a female adult.
(27) Arsenic, 0.012 grains from the organs of a male adult.
(28) Hydrocyanic Acid, traces from the stomach of a female child.
(29) Hydrocyanic Acid, traces from the stomach of a female child.
(30) Hydrocyanic Acid, traces from the stomach of a female child.
(31) Hydrocyanic Acid, traces from the stomach of a male child.
(32) Hydrocyanic Acid, traces from the stomach of a male infant.
(33) Hydrocyanic Acid, traces from the stomach of a male child.
(34) Arsenic, 1.48 grains and Cresols from the stomach of a male adult who drank Cattle Dip in mistake for rum.
(35) Hydrocyanic Acid and Acetone, traces from the stomach of a female child.
(36) Hydrocyanic Acid and Acetone, traces from the stomach of a female child.
(37) Hydrocyanic Acid and Acetone, traces from the stomach of a male child.
(38) Large traces of an alkaloid resembling Cocaine from the viscera of a male child.
(39) 0.5 grains of an alkaloid resembling Cocaine from the viscera of a female child.
(40) Ptomaines, large traces from the organs of a female adult.

Negative results were obtained in 31 cases.

*Vomits* (4)—
(1) Alcohol.
(2) Lysol.
(3) Nitrobenzene.
(4) Negative.

*Stomach Washings* (2)—
(1) Alcohol.
(2) Negative.

*Substances examined for Poison* (98)—

98 Substances and articles in connection with 45 different cases gave positive results in 38 cases as follows:

(1-4) Resinous matter of the nature of a poisonous Glucoside from exhibits of Mammee Sapota.
(5) Perchloride of Mercury in a liquid used by an attempted suicide.
(6) Lysol in a liquid used by an attempted suicide.
(7-9) Lysol in a glass, spoon, and bottle, used in an attempt at suicide.
(10-11) Nitrobenzene in a phial and on portion of mattress in a case of suicide.
(12-13) Powdered glass, 54 and 24 grains respectively in 2 cooked foods.
(14-15) Arsenic and Cresols in a bottle and glass in a case of suicide by drinking Cattle Dip.
(16) Castor meal in a sample of locally made oil suspected to have caused death.
(17) Powdered glass in a specimen of water.
(18) Antimony (Tartar Emetic), 3 grains in a specimen of cooked food.
(19) Powdered glass, 7.4 grains in prepared cocoa.
(20) Tung Oil and Petroleum in a specimen sold as Castor Oil.
(21-23) Potassium Cyanide in a bottle, tumbler, and on a photograph in a case of suicide.
(24) Arsenic and Cresols in a specimen of Naseberries used in an attempt at poisoning.
(25) Arsenic and Cresols in a liquid.
(26) Yellow Phosphorus, 0.62 grains per gallon, in water suspected to have been poisoned.
(27-28) Glucosides of Piscidin (Dogwood) in fish.
(29) Urine in a specimen of Porridge.
(30) Arsenic, 119 grains in Coconut Meal used to poison poultry.
(31) Arsenic, 2.1 grains in porridge used in an attempt at poisoning.
(32) Arsenic, 18.3 per cent. in a specimen of "Neoarsphenamine".
(33) Arsenic, 1.48 grains and Cresols in cooked food (rice and peas) suspected to have been poisoned.
(34) Arsenic in a specimen of suspected poisoned liquid.
(35) Powdered glass, 9 grains in a bottle of medicine.
(36) Powdered glass, 12.8 grains in cooked food.
(37) Copper Sulphate, 1.8 grains per quart in a specimen of coffee poisoned with Bodreaux Mixture.
(38) Yellow Phosphorus, large traces in suspected poisoned bread.

## (I) Police Exhibits, Criminal and Toxicological.

The number of exhibits for the Police, 3,113, shows an increase of 248 over last year, and the number of certificates issued in connection with the analyses, 501, an increase of 47, both of which figures constitute a record over any previous year.

The analyses of human viscera and organs in cases of suspected poisoning showed a decrease of 66 from the previous year, being 121 as against 187.

Substances and articles examined for poison also showed a decrease, being 98 as against 216 for the previous year, a decrease of 118.

Examination of exhibits in cases of murder, 62, showed an increase of 16 over last year, and continues to show a steady increase from year to year.

A total 691 exhibits were submitted in connection with breaches of the Coining Law, as against 1,211 for last year, a decrease of 520. Included in the 691 exhibits were 271 counterfeit coins and 187 articles used for making base coins, such as moulds, metals, chemicals, etc., a decrease of 176 and 304 respectively from the previous year.

The large decrease in counterfeit coins and exhibits examined must be attributed to the determined efforts displayed by the Police during the latter half of 1936 in tracking down and securing convictions against most of the counterfeiters and utterers, mention of which was made in last year's report.

Opium and opium exhibits numbered 314, being an increase of 159 over the previous year.

Ganga and ganga exhibits, including 35 specimens of tobacco suspected to contain ganga, numbered 1,600, being an increase of 1,099 over last year. The large increase of 1,258 exhibits submitted under The Dangerous Drugs Law bear testimony to the efforts of the Police to put down the evils of opium and ganga smoking in the Colony.

The number of samples submitted under the Spirit License and Rum Duty Laws remains about the same as last year, being 82 as against 85, and included 17 liquids which were seized along with other materials in a Police Raid upon an illicit still operating in St. Andrew.

Arson exhibits numbered 71 as against 154 for last year, and comprised various articles of clothing, burnt residues, etc., which had been treated with inflammable liquids. In one case investigated a clever "firing device" was examined in which the reaction of chemicals was used to fire a charge of gasoline in a barrel. The culprit responsible for the "device" had evidently used a similar device with success in several fires before being caught. He was tried, convicted, and sentenced to four years imprisonment.

A case of maiming revealed that strong Sulphuric Acid had been thrown by a man upon a woman.

Exhibits under The Medical Laws numbered 14 as against 18 for last year, and comprised various medicines, herbs, pills, etc.

"Obeah" exhibits showed a decrease of 26 from last year, being 16 as against 42.

Specimens of fish examined under The Protection of Birds and Fishes Law revealed the presence of Glucosides of Piscidin (Dogwood), and confirmed the suspicions of the Police that this substance had been illegally used in the catching of fish by certain parties in Portland.

11 exhibits, comprising shoes, earths, etc., were submitted is cases of Housebreaking and Larceny, and in each case it was possible to prove the similarity of the earths where the crimes were committed to that found on the shoes, etc., of the suspected parties.

Specimens of Finger Print Powders were examined and analysed on behalf of the Criminal Investigation Department with a view to cheapening the cost of these articles.

Three cases of adult male suicide investigated showed that Nitrobenzene, Arsenic and Cresols (Cattle Dip), and Potassium Cyanide had been used to destroy life. In the case of a female adult suicide Arsenic and Cresols (Cattle Dip) had been used.

Two cases of accidental poisoning showed that in both cases Arsenic and Cresols (Cattle Dip) had been taken by mistake, in one case for medicine and in the other for rum.

Eleven of the cases investigated for poison revealed the presence of Hydrocyanic Acid, all of which were probably caused by the consumption of Bitter Cassava, as positive evidence of the eating of "Bammies' was forthcoming in no less than 6 cases.

## (II) Customs and Excise Department. (391).

Analyses and examinations done for this Department showed a decrease this year, being 391 as against 457 for the previous year.

121 Fabrics, silks, etc., were analysed for classification under the Tariff Laws.

A total of 119 Native Wines, Rum Punches, etc., were analysed for their alcoholic content with a view to assessing the amount of refund of duty on the alcohol used in their manufacture.

20 Flavouring Extracts and Essences, 3 more than last year, were tested for alcoholic strength and for prohibited constituents in the interest of Public Health.

A large cylinder of compressed gas imported by certain parties was found on analysis to consist of a mixture of Ethylene Oxide and Carbon Dioxide.

During the year Orders by the Governor in Privy Council were brought into force prohibiting the importation of Ethyl and Methyl Alcohols into the Colony, except under special permit. New Regulations have also now been brought into force whereby all alcohol required for Power Fuel and Methylated Spirits will be denatured by Customs Officers in accordance with forumla worked out by the Deputy Island Chemist, Government supplying the denaturants at cost to the parties concerned.

Most of the other analyses carried out for this Department were mainly in connection with the determination of the nature of the articles with a view to their classification under the Tariff Laws and called for no special comment.

## (III) Department of Science and Agriculture. (33).

2 Specimens of animal viscera for poison, both of which proved negative, were examined on behalf of the Senior Veterinary Officer of the Department. 5 substances, swabs, washes, etc., suspected to contain "dope", as well as 2 concentrated Cattle Dipping Fluids, and a Plant Specimen were also analysed for this Officer and reports rendered to him on the same.

Annatto, 3 specimens, all of which were found to be adulterated with Red Earth, were analysed on behalf The Chief Inspector of Produce. A specimen of Honey submitted by the same Officer was found to be genuine and free from adulteration.

6 samples of Distillery Products were analysed for the Plant Pathologist in connection with Distillery problems, and 2 metal-bearings with regard to their replacement by similar suitable alloys.

Specimens of an Insecticide, Wood Preservative, and a sample of Cuprous Oxide were analysed on on behalf of the Government Entomologist and the Government Botanist.

### (IV) Island Medical Department. (27).

10 Fresh Milks were analysed during the year, 5 of which (50%) were found to be adulturated with added water ranging from 12 to 30%.

A specimen of Sardines was found to contain 0.875 grains of Tin per lb., probably derived from the inside of the tin plate which showed signs of attack due to slight decomposition of the fish. The sample was reported as being unfit for human consumption.

2 samples of Aerated Waters examined were found to be free from adulteration.

11 samples of water were analysed for various Medical Officers of Health, mostly in connection with contemplated new supplies.

### (V) Department of Public Works. (86).

85 samples of Native Corn were examined on behalf of this Department in connection with contracts made for the more general use of this article, and showed that a high standard was being maintained.

The composition of a Diesel Engine Starting Fuse was ascertained by analysis, and test fuses made by the Superintendent of Machinery from directions supplied by the Deputy Island Chemist were found to be satisfactory.

70 different lots of Cassava tubers grown under different conditions, and reaped at various ages, were carried out on behalf of the Jamaica Agricultural Society to test the most favourable conditions of starch production.

The 6 analyses carried out for the Kingston and St. Andrew Corporation, and the Water and Sewerage Commission were of a more or less routine nature and call for no special comment.

### General Samples.

945 samples of fresh milk were analysed for the Government Stock Farm and the results obtained continue to point to the high quality of this supply to the various Public Institutions catered for.

60 samples of liquid from Cattle Dipping Tanks were tested and the necessary recommendations made for bringing the tanks up to correct strength.

Samples of Sugar 32, and Rum 109, show a slight increase over the figures for last year, 22 and 98 respectively.

11 samples of water were analysed for various persons to ascertain their suitability for use as domestic supplies, or for boiler feed purposes.

The manufacture of Paranaph and the preparation of Fly Killer and Book Poison was continued throughout the year. In almost all instances the quantities of various materials stocked for sale to the Public show an increase over last year, and this is reflected in the larger amount received for Laboratory Sales, which show an increase of £214 13s. 1d.

The supply of chemicals, etc., for use in fumigating imported plants at the various Fumigatoria, as well as for the destruction of stray dogs by the Police in Kingston, was carried out from time to time during the year.

2,138 letters, orders, etc., were received and dealt with during the year. This number is not inclusive of personal and cash orders dealt with.

The following table shows the nature and amounts of materials supplied to the public for the past five years, also the amounts collected in fees and for sales during the same period.

| Items. | 1933. | 1934. | 1935. | 1936. | 1937. | Weight. | Remarks. |
|---|---|---|---|---|---|---|---|
| Paranaph .. | 39,850 | 33,373 | 36,654 | 35,942 | 38,976 | lbs. | |
| Arsenite of Soda | 24,818 | 20,300 | 21,200 | 19,736 | 21,650 | lbs. | |
| Copper Sulphate .. | 8 | 4 | .. | .. | .. | lbs. | Sale discontinued. |
| Carbon Bisulphide .. | 2,010 | 1,164 | 1,338 | 866 | 1,092 | lbs. | |
| Rat Poison, bulk .. | 210 | 130 | 183 | 183 | 201 | lbs. | |
| Rat Poison, 1 oz. packets .. | nil | 550 | 301 | 70 | 72 | pkts. | |
| Thymol Powders .. | 393 | 248 | 167 | 230 | 165 | ozs. | |
| Standard Iodine Solution .. | 45,000 | 34,500 | 36,000 | 29,750 | z 36,000 | c.c's. | |
| Starch Solution .. | 245 | 196 | 187 | 161 | 176 | bottles | |
| Soda Bicarbonate .. | 44 | 31 | 42 | 31 | 37 | bottles | |
| Testing Cylinders .. | 15 | 9 | 15 | 13 | 22 | No. | |
| Testing Bottles .. | 11 | 8 | 18 | 10 | 16 | No. | |
| Cyanogas .. | 29 | 25 | 273 | 187 | 81 | lbs. | |
| Fly Killer .. | 229 | 332 | 349 | 430 | 538 | gallons | |
| Book Poison .. | 18½ | 8 | 11½ | 13 | 13 | gallons | |
| Laboratory Fees .. | £179 8 0 | £240 1 0 | £143 9 0 | £184 5 6 | £180 2 1 | | |
| Laboratory Sales .. | £1,073 8 2 | £923 19 0 | £996 6 1 | £995 0 0 | £1,209 13 1 | | |

STAFF.

The Staff of the Government Laboratory on the 31st December, 1937, consisted of:

| | |
|---|---|
| The Deputy Island Chemist .. .. | 1 |
| Assistant to the Deputy Island Chemist .. | 1 |
| Technical Assistants .. .. .. | 4 |
| Clerk and Storekeeper .. .. .. | 1 |
| Storeman and Boiler Attendant .. .. | 1 |
| Messengers, male 1, female 1 .. .. | 2 |
| Total .. | 10 |

During the year the following officers were absent on leave:—

Mr. W. L. Barnett, Deputy Island Chemist, 1st July, 1936, to 25th January, 1937.
Mr. E. K. P. Blake, Technical Assistant, 9th August to 22nd August, 1937.
Mr. D. G. C. Davis, Technical Assistant, 26th April, 1937 to 20th June, 1937.
Mr. C. A. Little, Technical Assistant, 3rd August, 1937 to 30th August, 1937.

From the 6th July to 7th November, 1937, Mr. W. L. Barnett officiated in the capacity of Acting Island Chemist and member of the Rum Control Board whilst the Director of Agriculture and Island Chemist was on leave. During this periodMr. E. N. Richards held the position of Acting Deputy Island Chemist.

Mr. A. G. Wright left the Department during the yea r at the termination of his period as an apprentice.

Improvements to the Laboratory during the year comprise the reconstruction of the Photographic Room according to the design of the Deputy Island Chemist whereby photomicrographic and other photographic work is facilitated; the provision of a fly proof chamber for the dissection of human viscera under more hygenic conditions, and also the construction of two sanitary conveniences and toilet for the senior members of the staff.

W. L. BARNETT, M.A., B.Sc., F.I.C.,
Deputy Island Chemist, Jamaica.
19.2.1938.

*(xiii).—Report of the Entomologist for the year* 1937.

Director,

I have the honour to submit hereunder a report on activities in the Entomological Division during the year 1937.

GENERAL.

The pests found attacking plants are recorded hereunder under separate headings and according to the crops affected.

Apart from investigations carried out in connection with such agricultural problems considerable time has been devoted to investigations regarding the preservation of structural lumber. By a systematic survey carried out in the urban areas of Kingston and St. Andrew the economic importance of the species of termites which attack lumber has been ascertained. Special reports have been submitted in this connection; subsequently the Entomologist has been appointed to act in an advisory capacity to the Central Housing Authority.

By means of demonstrations, lectures and literature, sustained efforts have also been made to educate the public in general and particularly the Field Staff of this Department and of the Jamaica Agricultural Society, in applied entomology. Several meetings of agriculturists were attended, when explanations were given about entomological problems of special interest. Collections of exhibits of pests of economic importance have been extended whilst an illustrated Text Book of Applied Entomology for the use of students of the Farm School and Agricultural Officers have has been prepared for publication.

With the steadily increasing amount of advisory work and the numerous investigations which have to be carried out in connection with problems which arise as new crops are being raised and as greater attention is being given to the intensive production of staple crops it is felt that the Entomological Division needs additional staff to cope with the routine work and particularly to undertake in the fields experiments with insecticides and also to help in experiments in connection with the preservation of lumber.

The Entomologist acted as Government Botanist from the 24th November. The Technical Assistant was on vaaction from the 27th September to the 20th November.

During the year special reports on entomological problems of particular interest have been submitted to the Director of Agriculture.

Identification of insect specimens submitted by other Government Departments and by the public, and advising with regard to the control of pests have been continued as part of the routine work.

INSECT PESTS.

*Sugar Cane.*—After heavy and prolonged rains during the month of October an outbreak of *Aphis sacchari* occurred in St. Catherine.

Intensive outbreaks of *Lachnosterna* grubs occurred over restricted areas on two properties in Trelawny and the Brown Weevil *Metamasius sericeus*, (Oliv.) has been found in destructive numbers in several parts of the Island. At the end of the year a survey was started on sugar estates, to ascertain the economic importance of the various species of 'white grubs' which attack sugar cane. Where outbreaks had occurred the above mentioned pests were rapidly brought under control by mechanical destruction and the adoption of measures of field sanitation.

A Survey of the incidence of the Moth Borer, *Diatraea saccharalis*, F., among the varieties of cane grown at Hope gave the following results:

| | |
|---|---|
| F. C. 916 | 10.89 per cent nodal infestation. |
| S. C. 12/4 | 3.77 " |
| Ba. 11569 | 3.4 " |
| P.O.J. 2878 | 2.48 " |
| M. 28 | 2.0 " |
| Mexican Stripe | 1.86 " |

B. 726, B. 417, P.O.J. 2714 and White Transparent varieties and also 9 months' old ratoons of Co. 281 and Co. 213 growing in contiguous plots were not found infested.

*Coconut.*—Apart from infestation of a few trees at Reading by the Bostrychid, *Apate monachus*, Pall., attacking the petioles of coconut leaves, a restricted outbreak of the Fringed Scale, *Asterolecanium palmae*, Ckll. in Portland and of the Shot Hole Borer, *Xyloborus perforans* Woll., at Ocho Rios, this crop has not suffered from insect pests.

*Banana.*—A considerable amount of attention was given to this crop. With a view to establishing predators to combat the Weevil Borer *Cosmopolites sordidus*, Germ., banana suckers were collected in areas known to be free of Panama Disease and planted closely in a field highly infested by the pest on the grounds of the Industrial School at Stony Hill.

The predatory beetles *Plaesius javanus* Er. imported from Fiji were subsequently liberated in those plots.

*Citrus.*—On account of the considerable progress which has been made in spraying as a routine practice in most citrus plantations, Scale Insects have caused little damage to the plants whilst rejection of fruits at the packing houses has been considerably reduced.

In certain districts however control of red spiders still need to be considerably improved and efforts are being made to teach citrus growers how the pest should be controlled by the judicious choice and timing of sprays.

Damages done by the Root girdler of citrus *Prepodes vittatus*, L. and *Prepodes similis*, Dru. var. *amabilis*, Waterh. have been severe in certain areas. Investigations in the Laboratory and subsequent field demonstrations on a large scale have proved that when the pest is attacked in the egg and adult stages measures of control when systematically applied are effective, easy and economical. It has been found that under field conditions parasitism of the eggs by the wasp *Tetrastichus haitiensis* Gahan, attains on the average 25% of the total number of eggs laid by the pest. Those eggs are laid on the host plant in batches between two leaves glued together. The egg masses contain from 60 to 100 eggs and the percentage of batches visited by the parasite average 50%.

The wasps emerging from egg masses kept in closed containers parasitized freely unparasitized eggs placed in the containers; breeding and liberation of the wasps in large numbers from egg masses collected in the groves can therefore be easily done by citrus growers themselves as an adjunct to direct methods of control.

In the fields newly hatched grubs of the root girdler are also attacked by predatory ants whilst older ones are preyed upon by the larvae of the firefly *Pyrophorus luminosus*, Illiger.

The Black Bird known locally as 'Cling-Cling' and the Giant Toad *Bufo marinus* which eat large numbers of adult weevils should be protected instead of being destroyed.

*Truck and Garden Crops,*—A severe outbreak of the Hornworm, *Herse cingulata* Mer., occurred over an extensive area planted with Sweet Potato at Spanish Town Prison Farm. To control the pest dusting with Sodium Fluosilicate was effective, whilst dusting with Calcium chloroacetate proved injurious to the foliage. Sodium fluosilicate was also effectively used to control the "Golden Tortoise Beetle" *Chirida signifera*, Hbst., and the other Chrysomelid, *Metriona flaviolineata*, Latr., which also attacks the leaves of Sweet Potato.

The larvae of *Ligyrus tumulosus* Burm., and of *Lachnosterna jamaicensis*, Arrow, destroyed the roots of *garden egg* plants whilst the Cerambycid beetles *chloridea festiva*, L. and *Estola attenuata* Fish. were found boring into the stems. That crop also suffered from attacks by the 'flea beetle' *Epitrix parvula*, F., and by the ant, *Solenopsis geminata*, F.

A severe outbreak of the 'Lace Wing Bug' *Corythuca gossypii*, F. occurred in St. Thomas on Gungo peas (*Cajansus indicus**). The pest was also found in destructive numbers on Eggplants, Okra and *Hibiscus*.

In St. Andrew the 'bag worm' *Oiketicus abbottii*, Grote, defoliated roses and shade trees such as Cupressus, Lignum vitae and Tropical almonds (*Terminalia catapa*).

Other insets causing injury to ornamentals and vegetables have been:

*Lecanium longulum*, Dougl. infesting Gerbera,
*Aulacaspis pentagona*, Targ. " Hibiscus, Geranium, Alamander,
*Asterolecanium pustulans*, Ckll. " Geranium,
*Lachnosterna jamaicensis*, Arrow " Plumbago and Acalypha
*Coccus viridis*, G. "June roses" (Lagestraemia sp.)
*Psiloptera torquata*, var. *Jamaicensis*, Fish. Roses bushes
*Margaronia hyalinata*, L. defoliating Vegetable Marrow.
*Plutella cruciferarum*, Zell defoliating Cabbage
the Coreid *Phthia pitcta* , Dru. causing scars on Tomato.

*Investigations with regard to the problem caused by termites.*

Destruction of lumber by termites having increased considerably during recent years, investigations have been systematically carried out to ascertain:—

(a) the causes which have created this state of affairs.
(b) What measures can be taken to control the heavy losses which are thus being sustained by Government and by the public.

A survey which has been conducted in the urban areas of Kingston and St. Andrew has revealed that destruction of structural lumber is not caused by the establishment of any exotic species of termites, but by the fact that circumstances are now more favourable to the activities of species which have for very many years been known in Jamaica. The species of economic importance have been found to be:—

1. *Cryptotermes brevis*, Walk., which attack dry wood and whose colonies live entirely confined in lumber.
2. *Leucotermes tenuis*, Hagen., whose termitaries are in the ground and which infest the woodwork of buildings by constructing earth-covered pathways over any objects affording bridges from the soil to the superstructure, or by creeping through cracks in foundations and boring through wooden piers used to support sills, etc.

3. The species locally known as "duck ants", *Nastutitermes rippertii*, Ramb., which builds conspicuous nests on branches of trees, on fence posts, etc., attacks wood which contains a high percentage of moisture. It hastens the destruction of old lumber already attacked by rot, and infests timber frequently exposed to humid conditions in sheds and outbuildings. Except where creepers and other plants are allowed to keep constant humidity, over wooden structures this species is not responsible for considerable damage in the urban area.

The main causes to which the prevalence of the two first mentioned species can be ascribed are:—

(a) During a relatively recent past a great number of buildings have been erected in Kingston and St. Andrew. Their proximity greatly facilitates the spread of *Cryptotermes brevis*, which being completely adapted to conditions existing in buildings, whilst unable to live in the open, only spreads easily when buildings are situated near to each other.

(b) As a result of the scarcity of native hardwoods, relatively cheap imported furniture made of susceptible wood are now in general use. Such objects, which are soon infested by 'dry wood' termites, carry infestation from building to building wherever they are transported.

(c) The use of salvaged lumber, particularly doors and window frames made of imported soft woods, have also been found to be a common carrier of the above-mentioned pest.

(d) The fact that no elementary precautions are usually taken to prevent the pest from obtaining access to hidden recesses (which, being unpainted are very attractive to the pest), facilitates its establishment in buildings which, with some attention, could be effectively preserved.

The high concentration of the population of soil-inhabiting termites in the older parts of the urban area is primarily due to.—

(a) The fact that now for several centuries wooden buildings have been rebuilt on the same grounds, without any measures ever having been taken to destroy the existing foci of infestation.

(b) The careless burying of wooden debris from older buildings when sites are cleared for reconstruction, masses of food material being thus constantly provided for the pest.

(c) Tree stumps and wood debris of all kinds are generally left to rot under or around buildings, whilst closely spaced fence posts, for which susceptible timber is frequently used, afford great facilities for the pest to multiply and to spread rapidly from building to building.

(d) The fact that native hardwood lumber, having become so scarce, is now seldom used for building purposes, whilst imported lumber of very inferior grade and very attractive to termites has been extensively used in an irrational manner, has also favoured termite infestation.

Whilst termites have thus been provided with an abundance of food material, measures for controlling this pest are not judiciously applied. Protection against infestation by means of architectural devices is not considered in building codes whilst storage, utilization and transport of infested material, and eradication of dangerous foci of infestation within the urban area is not regulated by Law.

To call the attention of the public and also of Government institutions to the termite problem, a "Progress Report on Damages done by Termites in Kingston and St. Andrew" has been published as Bulletin No. 10 of the Department of Science and Agriculture.

To popularize information about (a) methods of construction which would greatly minimize risks of infestation of new buildings and (b) methods of repairs when old buildings are concerned and to explain how and when insecticides should be used to control existing foci of infestation, an illustrated pamphlet has been prepared and submitted to Government for publication.

Whilst the writer believes that it was necessary to carry out investigations and to publish all necessary information about methods of control, he remains convinced that little material progress in controlling the pest will be made unless legislation is enacted and enforced to secure co-operative action, and mainly until public institutions in charge of the construction and upkeep of buildings begin to organize measures of control in a logical and energetic manner, and adopt methods of construction that could serve as a demonstration for the general public.

### Conditions existing in Government Buildings.

Though in new buildings lumber has to a great extent been replaced by concrete and metal, the damage done there by termites to wooden floorings, ceilings, as well as to furniture, books, papers and other susceptible materials stored therein, is relatively as heavy as usually occurs in the more modest privately owned wooden houses.

Such a deplorable state of affairs originates from defective methods of construction which usually could be easily avoided.

To stop losses sustained by Government and also to be in a position to demonstrate to the public what can be achieved by working in the right direction, collaboration with the Public Works Department has been constantly sought, and a Memorandum on the advisability of organizing, on logical lines, termite control in public institutions has been submitted by the writer through the Director of Agriculture to the Director of Public Works.

It has to be pointed out that constructions are now made which invite infestation, whilst repair work as generally carried out in public buildings merely provides fresh food for termites. It is therefore essential that those who plan buildings and those who supervise constructions and works of repair should have opportunities of learning the elementary principles on which rest the methods for controlling the native species of termites.

With that aim in view, the writer has already offered to organize a course of demonstrations and lectures for the benefit of the officers of the Public Works Department. It has also been suggested that until they have acquired sufficient experience, those in charge of repair work should, before undertaking such work, report fully on their inspection and describe the causes which, in their opinion, have led to the infestation observed and which have to be corrected to prevent immediate recurrence of infestation and damage. By means of such reports, checked by the Entomologist, the above-mentioned staff would gradually acquire experience, whilst statistical data about the importance of damage done to buildings by termites would also be obtained. Within a few years it would thus be possible to reply with all necessary accuracy to the questions put by the Secretary of State for the Colonies in his despatch dated 1st February, 1936.

Whilst conducting investigations with regard to the preservation of lumber the following wood-boring insects came under observation:

*Platypus difficilis*, Chap. in trunk of young plum tree as well as in Hog plum fence posts.
*Xyloborus confusus*, Eich. in Hog plum fence posts.
*Dinoderus minutus*, F.—in Bamboo used for making barns.
*Archyson surinanum*, L.—in Cashaw posts in Lumber Yards in Kingston.
*Lyctus tomentosus*, Rtt.—in Cigar shooks of Cedar from U.S.A.
*Coelosternum* sp. n.—in Hog plum fence posts.
*Xylocopa brasilanorum* L.—in old trunk of Silk Cotton tree.
*Lagochirus araeniformis*, Sloane—in old Birch.
*Tarpula mutabilis*, Waterh.—in bark of Hog plum.

*Household Pests.*—During the drier seasons two severe outbreaks of fleas occurred in St. Andrew. In both cases the species concerned was the Dog flea, *Ctenocephalus canis*, Curt.

*Stored Products.*—Pests found attacking and damaging stored products have been:—
*Carpophilus dimidiatus*, F.—attacking Banana Figs.
*Tribolium ferrugineum*, F.—attacking Banana Figs and flour.
*Ephestia kuehniella*, Zell.—attacking Chocolate.
*Calandra oryzae*; L.
*Silvanus surinamensis*, F. } attacking Macaroni.
*Brachypelpus brachypterus*, Sharp.
*Mylabris pisorum*, Linne,—attacking seed peas at the Jamaica Agricultural Society.
*Anthrenus varax, Waterh*—attacking the hair of different kinds of brushes.
*Lasioderma serricorne*, F.—attacking Carrot seeds at the Jamaica Agricultural Society, also in the storeroom of the H.M.S. "Apollo."

## Introduction of Beneficial Insects to Control Agricultural Pests.

*Natural Enemies of the Weevil Borer of Bananas: Cosmopolites sordidus*, Germar.

(a) *Plaesius javanus* Er.—On the 14th of August the first consignment of these predatory beetles forwarded by the Department of Agriculture of Fiji arrived in Kingston after a voyage of 16 days. The 702 specimens which arrived alive were immediately liberated in a selected field in St. Andrew where infestation by the weevil borer and other conditions were found favourable to the establishment of the predator. Other shipments are expected.

(b) *Dactylosternum hydrophiloides* McL. and *D. abdominale* L.—On the 29th of November the first consignment of these Hydrophilids were received from the Federated Malay States. The voyage by steamer having taken 70 days, during which the packing material had become bone dry, all the insects arrived dead. The attention of the responsible authorities has been called to that state of affairs and arrangements have been made so that subsequent shipments may travel under better conditions.

## The parasitic wasp 'Dasyscapus parvipennis' Gahan, a Natural Enemy of the Thrip Selenothrips Rubrocinctus, Giard.

With the kind collaboration of Professor A. M. Adamson of the Imperial College of Tropical Agriculture six consignments amounting to a total of approximately 25,000 adult wasps were received from Trinidad. These insects were liberated in St. Andrew on mango trees infested by thrips and in Clarendon in the Nursery of Cashew plants of the Jamaica Agricultural Society. At the end of the year the parasite was recovered in very small numbers on trees infested by thrips but it would be premature to say whether under local conditions they will control the pest effectively.

## Importation of the Coccinellid Cryptognatha Nodiceps.

At our request Mr. Alan Pickles, Government Entomologist of Trinidad, kindly undertook to collect and forward to Jamaica these predatory beetles for liberation, where the Scale Insect, *Aspidiotus destructor* was found destroying coconuts in the Cayman Islands. Several shipments were received but in every case most of the insects arrived in Kingston dead or in a dying condition.

In view of the results, arrangements have been made so that the predator will be established in Trinidad on rooted coconut palms infested by *Aspidiotus destructor*. The palms, contained in insect-proof cages, will then be forwarded to Jamaica, where they will be kept in quarantine at Port Royal pending shipment to the Cayman Islands.

## Activities of the Entomologist in the Botanical Division.

During the absence of the Botanist, the Entomologist having been appointed Acting Botanist, supervised the work in this Division. Such was principally concerned with the raising of seedling bananas; attention was given to the recording and planting of banana seeds sent in from the breeding plots; to the recording of germinations of new seedlings and to the planting out of seedlings in the nursery plot at Hope as they became sufficiently advanced.

During this period 151 seeds were received and planted; 106 seeds germinated and 41 new seedlings were planted out. The fixation of seedling root tips for cytological examination was supervised as also was the recording of the characteristics of seedling fruit reaped at Hope.

Details of work carried out in this Division during the period under review have been given to the Botanist for inclusion in his report. The writer desires to record the valuable assistance received from Mr. D. A. L. Segre, Technical Assistant, and of Mr. L. B. Robinson, Field Assistant attached to the Botanical Division.

W. H. Edwards,
Government Entomologist.
12th April, 1938.

*(xiv).—Report of the Agricultural Chemist,* 1937.

(I) Soil Investigations.

*Lower Clarendon Soil Survey.*—The detailed survey of an area of lower Clarendon, which was commenced in 1936, was completed in the earlier months of 1937, and a report submitted to Government.

The survey was undertaken with reference to a proposed irrigation scheme. It has been estimated that the most economical system to operate in the area would be one which would irrigate approximately 5,000 acres of land. The area which could be watered, however, would depend on the crops produced, on the nature of the soil and various other factors.

The problems placed before the Division of Soils and Agricultural Chemistry were therefore:—

(i) To determine if any land sufficiently fertile to warrant irrigation existed within the prescribed area.

(ii) To estimate the area of such fertile land and to determine if 5,000 acres are available, and if not if there is sufficient area to warrant establishing an irrigation scheme.

(iii) If sufficient area exists, to determine where the largest blocks of the most fertile soil occur, and to determine which districts would probably require the largest quantities of water.

(iv) To consider alternative possibilities for water distribution if land covered by the present project did not include sufficient fertile land.

(v) To advise on the most suitable crops for the area and to suggest which are most likely to produce sufficiently high returns to repay for the water used.

The several aspects of the investigation necessitated the preparation of a detailed soil map of the area. The mapping of the area was complicated by the number of soil types occurring, and the irregularity of their distribution. An initial survey was made by systematic auger sampling through the area to determine, and locate the various soil types. Inspection pits were prepared and examined in typical soils of each soil type. The auger samples were subject to determinations of reaction (pH determination), to the approximate determination of available nutrients, and to the determination of salt content. The pit samples were examined in detail. The survey necessitated the examination of 2,400 auger samples and over 600 pit samples.

The distribution of the various soil types has been mapped and maps of soil acidity, (pH values), salt content, vegetation, agricultural production and texture were prepared.

The area consists of a large alluvial plain, approximately rectangular in shape, and sloping from a height of about 160 feet in the north to sea level. The plain is bounded on the north by the white limestone foothills of the Mocho Mountain Range; on the west by the Manchester Mountains which are also composed of white limestone; and by the Milk River; on the east by a low outcrop of the conglomerate and Hayes beds, and on the south by a number of large properties which in the main belong to the West Indies Sugar Company. The south boundaries of these properties is the sea. The soils of these estates have been carefully mapped in the past and samples taken in the area indicate that the types do not differ materially from those in the upper portion of the plain.

Outcrops of white limestone are distributed over the plain and the underlying bed of the alluvium is white limestone. The most prominent outcrops are Kemps Hill in the south of the plain, Cart Wheel and a long main ridge running north-south in the west.

One small outcrop of more recent coast limestone occurs near to the village of Rest. Low out crops of the conglomerate Hayes beds are distributed irregularly through the area.

Although the surface of the plain is comparatively regular, the surface of underlying limestone is most irregular. Recent well borings have shown that within a mile of a high outcrop of limestone, the overlying bed of alluvium is over 300 feet in thickness.

The soil types occurring on the plain may be classified as follows:

*Alluvial Soils:*

(I) Soils derived from limestone.
  1. Terra rossa
    (i) Recent origin with free drainage
    (ii) Older with impeded drainage.
    (iii) Milk River alluvium.
  2. Black Calcareous Soils.

(II) Soils derived from various rocks. (mainly shales and conglomerates).
  1. River Minho alliuvium

(III) Soils of swamp origin.
  1. Marine clay
  2. Marine clay with superimposed sand.

(IV) Soils of mixed origin containing Rio Minho alluvium and marine clay.

*Sedentary Soils:*

(I) Hayes Beds soils.

The soils of limestone origin occur in the northern and north-western section of the area, the main areas occurring to the north of the Four Paths-Toll Gate road, and on the banks of the Milk River. They have been placed in their present position by washing from the limestone hills to the north and by the Milk River which in the past flooded over the plain to the south-east of Toll Gate.

The distribution of the remaining soils indicates that initially the Minho flowed in a course to the west of its present course, entering the sea near Milk River. The whole of the area removed from the limestone hills was covered by the river with sandy alluvial deposits. At a later date, possibly prior to the river assuming its present course, the greater part of the area was covered by swamp through which the sea passed. The swamp superimposed on the River Minho allivium a heavy yellow clay. The uniformity throughout the area of the depth at which the Minho deposits appear below the Marine clay indicate that once all the area was at sea level. In certain areas the soil composition indicates that the flooding river washed through the swamps and deposited material in them. Subsequently the whole area was elevated to its present position.

Some areas of the River Minho deposits were not covered by swamp clay.

Of the various soil types the exposed Minho deposits are the only soils which appear generally fertile They are for the most part light in texture (sandy loams or loams), are freely drained and are alkaline or slightly acidic (ph 6—6.5), contain fairly high amounts of available potash, but small amounts of phosphoric acid and nitrogen.

The marine swamp clays are highly acidic and contain little plant nutrient, are of unfavourable physical condition and contain salt and gypsum. In certain areas where mixing of Minho alluvium and Marine clays has occurred, soils of fairly high fertility are found, but they frequently contain a harmful amount of salt.

The Hayes beds soils are also highly acidic in reaction, of poor physical condition, contain very little plant nutrient, and are some of the most infertile soils in the area.

The Milk River alluvium consists of heavy, poorly drained clay, is highly acidic in reaction (below pH 5), contains very little plant nutrient, and is generally of low fertility.

The recent terra rossa with free drainage has an open texture, is alkaline or slightly acidic in reaction, contains little plant nutrient except nitrogren. Plants growing in these soils are enabled free development of roots and respond readily to artificial manure. These soils may be considered suitable for irrigation.

The older terra rossa with impeded drainage contains shot frequently forming a hard pan immeddiately below the surface, is acidic in reaction (pH 5-6), is low in nutrient content. The soils are of low fertility.

The black calcareous soils are alkaline in reaction, and with the exception of one area, of heavy but not unfavourable texture, and have a fairly high content of nutrients. They are soils of moderately high fertility.

The survey of the salt (sodium chloride) and gypsum content of the soil at a depth of 18 to 24 inches has been made. Salt occurs through the area where marine clays are deposited and, over considerable areas, in quantities sufficient to be toxic to economic crops. The salt content at the depth selected is not necessarily the maximum for the particular soil, but salt at this depth is most likely to affect plant growth.

## (I) TERRA ROSSA.

### (i) Recent.

*Pit* 4.—Deep red friable loam with uniform colour throughout, unless drainage is impeded. May contain small shot, loose on surface, layer being compacted below.

| Depth Ins. | pH. | O.M. %. | C/N. | N. %. | Potent Fertility Index. | NaCl. p.p.m. |
|---|---|---|---|---|---|---|
| 6 | 7.65 | 6.10 | 16.9 | .21 | 162 | |
| 12 | 7.75 | 3.45 | 16.4 | .12 | 95 | |
| 18 | 7.65 | 1.83 | 11.7 | .09 | 70 | |
| 24 | 7.65 | 1.21 | 10.0 | .07 | 55 | |
| 30 | 7.3 | .. | .. | .. | 43 | |
| 42 | 6.95 | .. | .. | .. | 44 | |
| 54 | 7.05 | .. | .. | .. | 28 | |
| 66 | 6.9 | .. | .. | .. | 38 | |
| 76 | 6.65 | .. | .. | .. | 41 | |

Available Phosphate (0-6″) Trace

Available Potash (0-6″) 163 p.p.m.

### (ii) Older.

*Pit* 3.—Light brown, friable, surface layer containing some shot, overlying reddish clay. Yellow mottling and streaking occurs below 9″ depth. With depth the yellow shale becomes paler until grey-white in colour. Red becomes lighter, streaks become wider in the lower layers.

| Depth. Ins. | pH. | O.M. %. | C/N. | N. %. | Potent. Fertility Index. | NaCl. p.p.m. |
|---|---|---|---|---|---|---|
| 5 | 4.9 | 6.72 | 20.2 | .19 | 200 | |
| 9 | 4.9 | 4.07 | 17.2 | .14 | 40 | |
| 12 | 4.9 | 2.38 | 14.7 | .10 | 25 | |
| 18 | 4.75 | 1.64 | 12.5 | .08 | 29 | |
| 24 | 4.5 | 1.19 | 9.5 | .07 | 85 | |
| 30 | 4.75 | .. | .. | .. | 38 | |
| 36 | 4.85 | .. | .. | .. | 32 | |
| 48 | 4.7 | .. | .. | .. | 32 | |
| 60 | 4.6 | .. | .. | .. | 43 | |
| 72 | 5.1 | .. | .. | .. | 45 | |

Available Phosphate (0-6″)Trace

Available Potash (0-6″) 136 p.p.m.

### (iii) Milk River.

*Pit* 11.—Very similar to previous type. Dark clay loam on surface changing at 6″ to ochre yellow, friable clay loam. Red and yellow mottling occurs which develops into red and white streaks.

| Depth. Ins. | pH. | O.M. %. | C/N. | N. %. | P.F.I. | p.p.m. NaCl. |
|---|---|---|---|---|---|---|
| 3 | 5.2 | 9.33 | 17.6 | .31 | 191 | |
| 6 | 4.9 | 6.91 | 17.6 | .23 | 127 | |
| 12 | 4.75 | 2.86 | 13.2 | .13 | 46 | |
| 18 | 5.0 | 1.34 | 12.4 | .06 | 40 | |
| 24 | 4.9 | 0.75 | 8.2 | .05 | 36 | |
| 30 | 4.85 | .. | .. | .. | 33 | |
| 36 | 4.7 | .. | .. | .. | 31 | |
| 48 | 4.85 | .. | .. | .. | 37 | |
| 60 | 4.6 | .. | .. | .. | 47 | |

Available Phosphate (0-6″) 9 p .p.m.

Available Potash (0-6″) 144 p.p.m.

### (I) Black Cacareous.

*Pit* 21.—Black heavy clay to 6″ then transition to yellow clay of uniform colour, but containing small particles of calcium carbonate and small "shot;'. faint red mottling at 48″.

| Depth Ins. | pH. | O.M. % | C/N. | N. % | Potent Fertility Index. | NaCl. p.p.m. |
|---|---|---|---|---|---|---|
| 3 | 6.3 | 7.77 | 15.5 | .29 | 383 | |
| 6 | 7.4 | 2.95 | 13.9 | .12 | 323 | |
| 12 | 7.6 | 1.66 | 13.7 | .07 | 252 | |
| 18 | 7.75 | 1.52 | 12.8 | .07 | 207 | |
| 24 | 7.75 | 1.39 | 1.44 | .06 | 235 | |
| 30 | 7.8 | .. | .. | .. | 231 | |
| 36 | 7.65 | .. | .. | .. | 235 | |
| 48 | 7.65 | .. | .. | .. | 174 | |
| 60 | 7.65 | .. | .. | .. | 235 | |
| 72 | 7.8 | .. | .. | .. | 199 | |

Available Phosphate (0-6″) 13 p.p.m.

Available Potash (0-6″) 58 p.p.m.

### (II) 1. River Minho Alluvium—

*Pit* 48.—Black or dark purple loam on the surface, with a paler purple brown clayey layer containing white grit between M6-12″ depth. Brown gritty loam becoming more sandy with depth until brown sand loose or slightly compacted is reached at 30″.

| Depth Ins. | pH. | O.M. %. | C/N. | N. %. | Potent Fertility Index. | NaCl. p.p.m. |
|---|---|---|---|---|---|---|
| 6 | 6.45 | 3.96 | 13.7 | .17 | 272 | |
| 12 | 6.45 | 1.50 | 8.4 | .10 | 111 | |
| 18 | 6.5 | 0.96 | 7.5 | .07 | 92 | |
| 24 | 7.0 | 0.63 | 6.5 | .06 | 66 | |
| 30 | 6.9 | .. | .. | .. | 56 | |
| 36 | 7.3 | .. | .. | .. | 66 | |
| 48 | 7.25 | .. | .. | .. | 55 | |
| 64 | 6.65 | .. | .. | .. | 50 | |
| 76 | 6.8 | .. | .. | .. | 35 | |

Available Phosphate (0-6″) 75 p.p.m.

Available Potash (0-6″) 583 p.p.m.

Available Potash (6-12″) 238 p.p.m.

## (III) 1a. Marine Clay (Clay below).

*Pit* 54.—Grey black clay or clay loam on surface becomes very compact and containing small shot between 6″-12″ depth. Pale yellow heavy clay containing white grit faintly mottled brown to 30″. Then becomes darker with purple tinge and occasional grey-green patches. Crystals of gypsum and sodium chloride occur. Brown sand or sandy loam below 48″.

| Depth Ins. | pH. | O.M. %. | C/N. | N %. | Potent Ferti-lity Index. | NaCl. p.p.m. |
|---|---|---|---|---|---|---|
| 3 | 6.15 | 8.20 | 18.1 | .26 | 383 | 0 |
| 6 | 5.5 | 2.98 | 13.5 | .13 | 114 | 0 |
| 12 | 5.0 | 1.69 | 11.8 | .08 | 80 | 0 |
| 18 | 4.6 | 1.09 | 9.4 | .07 | 224 | 0 |
| 24 | 4.2 | 0.88 | 9.1 | .06 | 569 | 907 |
| 30 | 4.2 | .. | .. | .. | 813 | 1,089 |
| 39 | 4.6 | .. | .. | .. | 1,110 | 1,683 |
| 44 | 5.45 | .. | .. | .. | 1,208 | 1,699 |
| 50 | 7.4 | .. | .. | .. | 1,732 | 1,831 |
| 60 | 7.4 | .. | .. | .. | 2,691 | 1,749 |
| 72 | 7.65 | .. | .. | .. | 1,261 | 1,963 |

Available Phosphate (0-3) 19 p.p.m.
Available Phosphate 3-6 17 p.p.m.
Available Potash (0-3) 149 p.p.m.

## (III) 1b. Marine Clay (Sand Below).

*Pit* 32.—Loose, pale grey sand containing some shot to a depth of 6″, overlying a dull yellow plastic clay slightly mottled, with brown and orange. Transition at 36″ to purple clay containing gypsum and sodium chloride. Changes into brown sand or sandy loam at 42 .

| Depth Ins. | pH. | O.M. %. | C/N. | N. %. | Potent Ferti-lity Index. | NaCl. p.p.m. |
|---|---|---|---|---|---|---|
| 3 | 6.5 | 10.05 | 14.4 | .41 | 342 | 297 |
| 6 | 5.6 | 2.84 | 12.5 | .13 | 128 | 115 |
| 12 | 5.35 | 1.84 | 12.9 | .98 | 128 | 165 |
| 18 | 5.6 | 1.72 | 12.1 | .08 | 240 | 544 |
| 24 | 5.6 | 1.61 | 12.8 | .07 | 502 | 1,270 |
| 30 | 5.1 | .. | .. | .. | 1,007 | 2,458 |
| 36 | 5.2 | .. | .. | .. | 979 | 2,046 |
| 42 | 5.6 | .. | .. | .. | 923 | .. |
| 48 | 6.6 | .. | .. | .. | 373 | 577 |
| 56 | 6.9 | .. | .. | .. | 483 | 610 |
| 72 | 7.05 | .. | .. | .. | 169 | 214 |

Available Phosphate (0-3) 39 p.p.m.
Available Phosphate 3-6 23.5 p.p.m.
Available Potash (0-6) 414 p.p.m.
Available Potash (0-6) 215 p.p.m.

## (III) 2. Marine Clay with Super-imposed Sand.

*Pit* 55.—Pale grey, loose sand, overlying dark, reddish-yellow clay, becoming reddish yellow with depth. Dull yellow at 42″. Purple clay containing salt crystals changing at 48″ into fine brown sand and gravel.

| Depth Ins. | pH. | O.M. %. | C/N. | N. %. | Potent Ferti-lity Index. | NaCl. p.p.m. |
|---|---|---|---|---|---|---|
| 3 | 5.4 | 5.39 | 14.4 | .22 | 311 | 0 |
| 7 | 5.3 | 2.58 | 13.4 | .11 | 60 | 0 |
| 12 | 4.6 | 1.79 | 9.3 | .11 | 62 | 0 |
| 18 | 4.4 | 1.45 | 8.5 | .10 | 221 | 0 |
| 24 | 4.1 | 0.62 | 4.6 | .08 | 407 | 181 |
| 30 | 3.9 | .. | .. | .. | 664 | 742 |
| 36 | 3.85 | .. | .. | .. | 971 | 1,386 |
| 42 | 4.0 | .. | .. | .. | 1,107 | 1,716 |
| 48 | 4.0 | .. | .. | .. | 1,245 | 1,419 |
| 60 | 4.15 | .. | .. | .. | 971 | 1,402 |
| 72 | 4.4 | .. | .. | .. | 876 | 1,552 |

Available Phosphate (0-3″) 18 p.p.m.
Available Phosphate 3-7″ 14 p.p.m.
Available Potash 0-7″ 83 p.p.m.

(IV) Soils of Mixed Origin.

*Pit* 49.—Dark, brown loam changing at 3″ to heavy compact clay of similar colour Becomes paler with depth, contains grit. Sometimes dull yellow brown, very compact and gritty. Changes to purple clay at 36″ and becomes lighter with depth. Sand at 42-48″ depth.

| Depth Ins. | pH. | O.M. % | C/N. | N. % | Potent Fertility Index. | NaCl. p.p.m. |
|---|---|---|---|---|---|---|
| 3 | 6.9 | 4.39 | 15.4 | 16 | 758 | 0 |
| 6 | 6.25 | 2.27 | 9.15 | 14 | 569 | 0 |
| 12 | 5.8 | 1.82 | 11.3 | 10 | 728 | 33 |
| 18 | 5.5 | 2.32 | 14.6 | 09 | 455 | 778 |
| 24 | 4.8 | 1.24 | 12.6 | (.06) | 791 | 1,336 |
| 30 | 4.8 | .. | .. | .. | 1,151 | 1,930 |
| 36 | 5.2 | .. | .. | .. | 1,065 | 1,419 |
| 42 | 6.7 | .. | .. | .. | 592 | 412 |
| 48 | 7.9 | .. | .. | .. | 835 | 1,188 |
| 60 | 8.3 | .. | .. | .. | 710 | 779 |
| 72 | 8.7 | .. | .. | .. | 370 | 83 |

Available Phosphate (0-3″) 22 p.p.m. Available Phosphate (3-6″) 4 p.p.m. Available Potash (0-6″) 360 p.p.m.

Soil Erosion.

The establishment of a Forestry Division and the appointment of a Forestry Officer during the year have enabled the problem of soil conservation to be approached on a broad basis.

The problems are being investigated jointly by the Officers of the Forestry and Agricultural Chemistry Divsions and a general scheme of work is being formulated.

Soils from Spanish Honduras and Guatemala.

A number of soils obtained during a visit to Central America have been examined. The soils were obtained from the vast alluvial plains of three Central American rivers.

All rivers rise in the vast central North American range. The soils they have deposited, while differing somewhat in texture, and to some small extent in composition, bear a close relationship to one another. The soils are all of a loam type and differ from the alluvial banana soils in Jamaica in the absence of coarser particles and the predominance of fine sand. All the soils examined were highly micaceous.

The soils contain large amounts of plant nutrients, on the average greatly in excess of the normal alluvial banana soil in Jamaica.

The chief characteristics of the soils are their high alkalinity, relatively low carbonate content, high available phosphate and very high available potash contents. The organic matter content varies considerably, but is, on the whole, relatively high for the conditions of high rainfall under which the soils exist. The soils are, however, replenished almost annually through the flooding of the rivers which they border.

Typical profiles are as follows:—

Typical Banana Soils—Spanish Honduras.

*Heavy alluvial soil—*

| Depth Ins. | Sand. | pH. | $CaCO_3$ 3 % | O.M. % | C/N. | N. % | Potential Fertility Index. |
|---|---|---|---|---|---|---|---|
| 3 | 13.00 | 7.8 | 0.39 | 7.27 | 15.9 | 0.27 | 332 |
| 6 | 12.10 | 7.75 | .01 | 7.88 | 16.8 | 0.27 | 347 |
| 12 | 11.10 | 7.8 | trace | 3.13 | 11.0 | 0.16 | 171 |
| 18 | 14.10 | 7.75 | " | 2.13 | 10.2 | 0.12 | 103 |
| 24 | 14.80 | 7.8 | " | 1.64 | 10 0 | 0.09 | 143 |
| 30 | 20.50 | 7.9 | 0.63 | .. | .. | .. | 59 |
| 36 | 21.10 | 8.45 | 5.51 | .. | .. | .. | 76 |

Available Phosphate (0-3″) 207 p.p.m. Available Phosphate (3-6″) 178 p.p.m. Available Potash (0-6″) 508 p p.m

*Light Soil—*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 3 | 8.50 | 8.05 | 5.40 | 3.99 | 11.0 | .21 | 218 |
| 6 | 21.20 | 7.75 | 0.51 | 5.88 | 10.6 | .32 | 443 |
| 12 | 24.00 | 8.2 | 0,70 | 3.70 | 9.6 | .22 | 311 |
| 18 | 21.60 | 8.4 | 1.23 | 1.93 | 8.0 | .14 | 133 |
| 24 | 25.30 | 8.4 | 5.15 | 1.46 | 8.4 | .10 | 114 |
| 30 | 37.00 | 8.55 | 7.73 | .. | .. | .. | 84 |
| 36 | 48.00 | 8.4 | 7.61 | .. | .. | .. | 77 |
| 48 | 56.50 | 8.2 | 6.90 | .. | .. | .. | 108 |
| 60 | 35.00 | 8.2 | 7.75 | .. | .. | .. | 143 |

Available Phosphate (0-3″) 216 p.p.m. Available Phosphate (3-6″) 368 p.p.m. Available Potash (0-6″) 770 p.p.m.

*Heavy alluvial soil—*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 3 | 10.70 | 7.65 | 2.09 | 3.72 | 11.2 | 0.19 | 54 |
| 6 | 13.80 | 8.05 | 4.61 | 3.82 | 10.2 | 0.22 | 77 |
| 12 | 13.90 | 7.9 | 3.64 | 2.55 | 9.0 | .16 | 317 |
| 18 | 17.80 | 8.05 | 1.83 | 1.66 | 8.4 | .11 | 206 |
| 24 | 15.90 | 7.9 | 0.01 | 1.51 | 7.9 | .11 | 169 |
| 30 | 16.60 | 7.5 | Nil. | .. | .. | .. | 54 |
| 36 | 17.70 | 7.65 | " | .. | .. | .. | 121 |
| 48 | 27.30 | 7.65 | trace | .. | .. | .. | 49 |
| 60 | 28.00 | 8.05 | " | .. | .. | .. | 77 |

Available Phosphate (0-3″) 249 p.p.m. Available Phosphate (3-6″) 252 p.p.m.
Available Potash (0-6″) 990 p.p.m.

Soils were obtained from areas heavily and lightly infected by *cercospora musae*.

There is no indication of any fundamental chemical differences between soils from the different areas. It is understood that many of the areas then considered relatively resistant to cercospora infection have since become heavily infected.

### General Soil Examinations.

A large number of soils have been examined at the request of planters. The problems concerned were mainly those of determining deficiencies of plant nutrients. Opportunities were taken to obtain further samples of typical soils of the island. The major crop concerned was bananas. The examination of the samples has confirmed earlier observations that the most highly productive banana soils are those containing a high content of available potash, many of them containing 500 or more parts of potash per million parts of soil.

Many soils producing bananas of good quality were highly acidic. Results suggest, however, that an acidity value of less than pH 6 may affect the growth of bananas, although marketable fruit can be produced from soil of pH 4.5. In most cases, high acidity is associated with low available phosphate content and it has not yet been possible to determine which factor is the major one in deterring growth.

Determinations have been made of the copper content of soils which had received regular applications of Bordeaux Mixture, resulting from spraying for the control of cercospora. At the time of sampling no great penetration of copper had occurred.

Certain areas where it was proposed to plant bananas were found to have a soil of high sodium chloride content.

An experimental area on a soil of fairly high fertility but in which there was a definite fertility grade was sampled systematically. The results of the examination give no indication of the cause of the fertility gradient.

A number of soils from sugar producing areas on inland basin alluvium were examined. The soils showed characteristic red and grey banding and, with few exceptions, could not be considered first class sugar cane soils. The nutrient content of the soils proved to be low and many were highly acidic. In one case attempts were being made to produce sugar cane on soil with a pH value of 4.5.

### General Agricultural Analyses.

The general samples submitted for analysis may be classified as follows:—

| | |
|---|---|
| Bat and Organic manures | 22 |
| Mixed fertilizers | 28 |
| Cane juice and molasses | 38 |
| Irrigation waters | 9 |
| Ashes—coconut | 4 |
| Plants and leaves | 6 |
| Limestones, marls | 11 |
| Miscellaneous | 3 |
| Total | 121 |

The number of mixed fertilizers submitted indicates that planters are aware of the desirability of having a guaranteed analysis of the mixed fertilizers that they purchase.

The bat guanos submitted were, as a general rule, very low in nitrogen and organic matter. In some cases the phosphoric acid content would justify their exploitation. The supplies of guano containing high nitrogen content apparently have been exhausted.

The marls and limestones were of high purity.

The owners of irrigation wells have not availed themselves of the offer to undertake regular examinations of well waters. Fluctuations in salt content with a general tendency to increase have been noted in one well from which periodic samples have been obtained. The necessity for careful examination of the water from new sources of supply cannot be over-emphasized. In some cases considerable financial losses could have been obviated had an analysis been made of the water before proceeding with the development of a fertilizing and planting scheme.

### Sugar Cane.

*Cane Yield Survey.*—A survey of yields of sugar cane obtained in the 1936-37 crop has been completed. The records of the survey will be published in a Departmental Bulletin. The average yield of cane per acre over the whole island was 29.08 tons. This average yield is probably the highest ever produced in Jamaica. The high yield is due to favourable weather conditions, to improved cultural methods and to better selection of varieties. Over a million tons of cane were ground in island factories for the first time in the present century.

The amount of cane purchased from cane farmers is approximately 80,000 tons greater than that purchased in the 1935-36 crop and is double that purchased in 1933-34 crop. A considerable proportion of this purchased cane is grown by small cultivators.

The average yield for the past four years is:

| 1933—34 | 1934—35 | 1935—36 | 1936—37 |
|---|---|---|---|
| 27.35 | 22.30 | 25.32 | 29.08 tons per acre |

The cane varieties B.H. 10/12 and P.O.J. 2878 predominate. B.H. 10/12 occupies forty per cent. of the total area in canes and P.O.J. eighteen per cent. The interest in other varieties is centred in obtaining higher yields from the poorer lands and in obtaining a high sucrose content of the juice in the early part of the crop season.

The figures quoted are based on a return of ninety per cent. of the total of estate cane ground during the crop, or seventy-seven per cent. of the total cane ground in the island. Much of the remaining twenty-three per cent. is produced by small settlers under conditions of cultivation not comparable with those obtaining on estates.

The average yield from plants was 40.8 tons per acre and for first ratoons 28 t.p.a., from second ratoons 21.t.p.a. The decrease in ratoon yields from the staple varieties is considerably less. The large decrease has been brought about to a certain extent by the small yields given by the ratoon crops of varieties other than B.H. 10/12 and P.O.J. 2878.

The data being accumulated over a period of years is providing a valuable record of sugar cane yields and fluctuations in sugar production.

*Sugar Factory Returns*—Weekly returns of sugar factory figures are made to the Division and a summarized report circulated to all factories. All factories except one contribute. The returns provide valuable statistics of the fluctuations in factory performance, in juice purity occurring during the season.

The yield of sugar, expressed as tons of cane required to manufacture one ton of sugar, from the three crops—1934-35, 1935-36, 1936-37 are as follows:—

| Factory. | 1934-35. | 1935-36. | 1936-37. |
|---|---|---|---|
| 1 | 12.03 | 12.01 | 11.18 |
| 2 | 10.81 | 10.13 | 9.84 |
| 3 | 9.76 | 10.12 | 10.54 |
| 4 | 8.94 | 9.56 | 8.93 |
| 5 | 10.06 | 9.10 | 9.83 |
| 6 | 9.26 | 9.35 | 9.17 |
| 7 | 9.32 | 9.11 | 8.04 |
| 8 | 12.42 | 13.26 | 13.75 |
| 9 | 11.93 | 10.71 | 10.19 |
| 10 | 9.32 | 10.32 | 8.98 |
| 11 | 9.37 | 9.49 | 8.11 |
| 12 | 10.04 | 11.49 | 10.03 |
| 13 | 11.64 | 10.19 | 10.39 |
| 14 | 10.13 | 9.72 | 10.67 |
| 15 | 9.60 | 8.92 | 9.67 |
| 16 | 9.15 | 10.06 | 10.78 |
| 17 | 12.00 | 10.25 | 10.18 |
| 18 | 9.66 | 9.57 | 10.31 |
| 19 | 10.60 | 11.28 | |
| 20 | 9.93 | 9.50 | 10.62 |
| 21 | 10.63 | 10.03 | 10.54 |
| 22 | 11.60 | 11.60 | 12.60 |
| 23 | 9.88 | 11.92 | 10.13 |
| 24 | 10.68 | 11.69 | 10.61 |
| 25 | 11.21 | 10.86 | 11.45 |
| 26 | 10.73 | 10.20 | 12.00 |
| 27 | 11.43 | 10.72 | 10.52 |
| 28 | 11.25 | 11.92 | 11.51 |
| 29 | 11.80 | 12.13 | 14.17 |
| 30 | 12.43 | 13.84 | 12.58 |
| 31 | 10.25 | 11.07 | 9.89 |
| 32 | 10.96 | 11.51 | 10.58 |
| 33 | 11.68 | 13.53 | 10.86 |

The differences between factories are due partly to the variation in the sucrose content of the cane in the different sections of the Island, and partly to difference in equipment. The range of sucrose content during the 1936-37 crop expressed as average sucrose per cent. Cane over the whole crop is 10.32 to 13.77. For purposes of comparing the performances of factories with different equipments, a system of classification based on a suggestion by a member of the Sugar Advisory Committee has been adopted. The factories are given marks according to their milling equipment, and grouped on the number of marks received. It is assumed that most factories are approximately balanced and that milling equipments will be an indication of general equipment.

*Wood Consumption by Factories:*—Data on the subject of wood consumption of factory furnaces have been collected. The general assumption that rum production results in high wood consumption has not been sustained by the returns. There is no obvious relationship between wood consumption and fibre content of cane. The main factor determining wood consumption appears to be furnace efficiency.

*Yields of Sugar per acre:*—The yields of various areas and varieties are compared almost entirely on the the basis of the yield of cane per acre. Data for determining the sugar yield per acre in relative detail can only be obtained following more detailed determinations of the sucrose content of the cane ground by individual factories. By correlating the available field and factory data it has been possible to obtain broad indications of the sugar yields of the various estates. The investigation was commenced following a suggestion that increased yields of cane which were obtained were compensated by a decreased sucrose content of the cane. The results indicate that the main factor in determining the yield of sugar per acre in Jamaica is the yield of cane, and that there is a linear correlation between the two factors.

*The Sugar Crop Season:*—Graphs have been prepared to demonstrate the fluctuation of sucrose content of juice in various districts during the crop period. In some districts the sucrose content of the juice is very low at the beginning and at the end of the crop period. The position could be improved by introducing varieties of cane which provide juice of good quality at the beginning and end of the season, and secondly by reducing the length of the crop period by increasing the capacity of the factory. The latter procedure is in most cases impracticable in present conditions, so that interest is concentrated on the

introduction of new varieties. In some instances there are indications that the period of the crop could have been advanced or retarded with advantage in the year under consideration. It would be necessary to continue the records for a number of years in order to determine to what extent the optimum cropping period fluctuates with weather conditions.

*Field Experiments:*—The total number of cane variety experiments now in progress is nine. With the addition of a further three experiments to include certain recently imported varieties, the number in progress in 1938-39 will represent the maximum which it is possible to operate with the staff and organization at present available. Each experiment is divided into two sections, one of which is reaped early in the cropping season and one later in the season. The early experiments are seeking to classify the established varieties. Experiments including more recently introduced varieties will be reaped in the 1938 crop. The results of the experiments have been made available to factories.

It has been necessary to reduce the number of manurial experiments on sugar cane to four in view of the increasing number of variety experiments, which have been established. The results of the experiments up to 1936 have been published in Departmental Bulletin No. 9 (New Series).

The results of the 1937 reaping have confirmed those given in the Bulletin.

*The Sugar Advisory Committee.*—One meeting of the Advisory Committee to the Sugar Industry was held during the year.

The members of the Committee are as follows:

The Hon. the Director of Agriculture, C.M.G., Chairman.
Hon. F. M. Kerr Jarrett.
Mr. H. H. Croucher, Agricultural Chemist, Secretary.
Mr. T. P. Evelyn.
Mr. M. S. Goodman.
Mr. E. Morris.
Mr. A. E. Muschett.
Mr. D. J. Verity.
Mr. L. B. Whitaker.

The Committee included in its membership representatives of the sugar producers of the Island and of the Department of Science and Agriculture.

Among other duties the Committee advises on the expenditure of funds placed under the administration of the Department by the Sugar Manufacturers' Association.

The following subjects are among those discussed.

1. The work and reports of the Central West Indies Sugar Cane Breeding Station.
2. The regulations with regard to Mosaic disease of sugar cane.
3. The proposed Conference of Primary Sugar Producers of the Empire.
4. A visit to Puerto Rico.
5. Statistical Reports on the 1936-37 crop.
6. Collection of additional statistical information.
7. The formation of the Jamaica Association of Sugar Technologists.
8. The basis of allotment of production in the event of restriction of output with particular reference to cane farmers.

*The Jamaican Association of Sugar Technologists.*

During the year the Jamaican Association of Sugar Technologists was formed with the co-operation of the Departmental Officers. The Director of Agriculture was elected President of the Association, the Agricultural Chemist was appointed Secretary of the Association. A successful conference was held at Hope in November when papers on engineering, chemical and agricultural problems in the production of sugar cane were presented by members of the Association. It is proposed to hold such meetings annually. The Proceedings of the Annual Conference have been published. The Association published a Quarterly Bulletin. The membership embraces persons engaged in all branches of sugar production.

## Bananas.

*Departmental Experiments.*—Observations on the growth and production of bananas on the Departmental banana experimental areas have been continued. Records of growth rate, and detailed measurements of the fruit produced have been made. The effect of the manures has been to spread the reaping period for the experiments over a comparatively long period, with the result that the fruit in many of the plots has only been partially reaped. Detailed analyses of the results are not possible until records of the fruit production have been completed.

The growth measurements and general observations have enabled some tentative conclusions to be drawn, which are as follows:—

(1) Deficiency of nitrogen, phosphate and potash may be the factors limiting growth of bananas. Thus at Grove Place where the soil is a terra rossa of low fertility status, and where the growth rate is so small that no crop has been produced on the unmanured plots, no response is obtained from nitrogen and phosphate in the absence of applied potash. The plots receiving potash and nitrogen have have given unusual growth.

At Durham, on a terra rossa soil of slightly greater fertility, little or no response is obtained from nitrogen and potash in the absence of applied phosphate. Phosphate and nitrogen has had some effect and potash in the presence phosphate and nitrogen causes a further improvement.

(2) It is common practice to cover the surface of the terra rossa soils with a deep layer of mulch and in many such areas bananas are grown only under such conditions.. Attempts were made at Grove Place, which is situated in such an area, to dispense with mulch. While unmanured plots have suffered most severely from the seriously dry conditions which existed, the bananas receiving potash have shown no signs of wilting. The development of the fruit, however, has been affected slightly.

(3) The general effect of nitrogen is to increase the growth rate of the banana tree, and to induce an earlier crop. While this may be by only a short period in the plant crop, the effect is cumulative in the ratoon crops.

(4) The application of phosphate in the absence of adequate potash has, in certain soils, the effect of inducing leaf ripening. The premature yellowing of leaves, as indicated by the number of unhealthy leaves, is greater in a plot receiving excess phosphate than in a plot not receiving excess phosphate. In certain extreme cases the leaves in existence at the time of shooting do not function for the full length of the period required by the fruit to mature. Before the fruit is ready for reaping all the leaves have ceased to function.

(5) The effect of potash has been pronounced in many cases. Application of potash in addition to the phosphate has rectified any condition induced by the excess phosphate.

(6) Observations in certain areas suggest a possible correlation between the secondary damage induced by cercospora and the balance in the soil between available phosphate and potash.

(7) The results of soil nitrate determinations and growth seems to indicate that the slowing up of growth in the earlier winter months may be due, in part, to the lowering of the nitrate content of the soil and to the decrease in the rate of nitrification of the applied ammonia.

It may therefore be desirable to apply nitrogen in the form of nitrate during the winter months. In areas of high elevation it may be beneficial to employ only nitrate rather than ammonium salts as a source of nitrogen.

(8) The initial response to phosphate application in some areas and potash response in others has enabled tentative limits of adequacy of these nutrients as estimated by chemical methods to be established.

*Greencastle Experiment.*

The experiment was designed to test the effect of monthly applications of Sulphate of Ammonia and alternate monthly applications of Sulphate of Ammonia and Nicifos on a Richmond Bed soil that analysis had shown contained a large amount of available potash but little available phosphate.

The initial application was made to young plants. Records were made at the time of shooting and weights and grades were recorded on reaping. The plots were badly damaged by wind on two occasions.

The results obtained from the plant crop indicate that the grade is slightly greater in plots rece ving nitrogen. The time required to reach maturity has been decreased slightly in the plots receiving phosphate.

There was no appreciable increase in the weight of the bunches.

The soil had been left fallow for some time previous to planting so that any marked effect of the manure on the plant crop would be improbable. The average grade of the plant crop in the unmanured plots was 69.6 per cent.

The experiment is being continued with the ratoon crop.

A further experiment has been laid down on this estate (a), to determine the effect of a dressing of a complete fertilizer at intervals of three and six months, and (b), to confirm the results obtained in the first experiment. The experiment will be first reaped in 1938.

*Crawle Experiment.*

The object of the experiment is to determine the effect of fertilizers on an old ratoon banana field which it is not desired to replant owing to the risk of inducing Panama Disease.

Each treatment has been applied to fifty-four trees. Plots were treated monthly with Sulphate of Ammonia, Nicifos and Sulphate of Ammonia, plus Sulphate of Potash.

The average grades obtained from the plots to date are as follows:—

| | |
|---|---|
| No manure .. .. .. .. | 56.2 |
| Sulphate of Ammonia .. .. .. | 65.6 |
| Nicifos .. .. .. .. | 65.3 |
| Ammonia plus Potash .. .. | 65.3 |

These results would suggest that the nitrogen was the factor which affected the results. An increase of 9 per cent. in the grade of the field would indicate a profit of about £2 per acre, after allowing for the cost of manure and application.

These results represent the average yield obtained over the period of the experiment. The actual grade produced by the manured plots at the present time may, however, be greater than that indicated by these figures, as the manures would affect grades of fruit reaped until at least six months after the first application. In such old ratoons the reaping period is spread over most of the year so that weekly or even monthly samples may not provide a true indication of the average grade being produced.

The experiments are being continued.

*Panama Diseases of Bananas.*

In 1934 manurial experiments were started on certain properties in St. Mary. The value of the experiments as a record of the use of fertilizers was destroyed by a severe drought in the first year, followed by a hurricane. It became evident that the incidence of Panama Disease would soon be such as to render the experiment of no value for the comparsion of the effect of the fertilizers used. In view of the fact that the plots were all marked and the initial cases of Panama Disease recorded, it was decided that a record of the spread of the disease should be kept. The information obtained from the plotting of the cases as they occurred leads to the conclusion that the disease is spreading very largely by contact. It appears that a focus is started by some accidental infection and from this focus the disease radiates. There are however, some cases which apparently do not cause any infection to the trees in the vicinity and there are also areas in the field where no disease has yet occurred. These areas are being observed to see if this apparent immunity is only transient.

The rate of spread of the disease on the two estates under observation is as follows:

*Estate A.*—River alluvium flat, well drained, not flooded during period of observation. Old banana field, replanted. Evidence of infection previous to replanting.

| | |
|---|---|
| No. of trees under observation .. .. .. | 2,084 |
| No. of cases 1935 .. .. .. | 53 |
| No. of cases 1936 .. .. .. | 248 |
| No. of cases 1937 .. .. .. | 615 |

*Estate B.*—Richmond Bed type soil. Undulating contour with general slope. Bananas planted in a field that had been rested for some years. No previous infection known.

| | |
|---|---|
| No. of trees under observation .. .. .. | 2,664 |
| No. of cases 1935 .. .. .. | 5 |
| No. of cases 1936 .. .. .. | 64 |
| No. of cases 1937 .. .. .. | 497 |

## Citrus.

*Grove Place Manurial Experiment:*—The applications of fertilizer have been continued to the experiments and rapid growth has resulted. While little difference in growth is yet apparent between plots receiving different types of manure, in general the trees receiving manure are in advance of those forming guard rows and not receiving manure.

Considerable damage has been done by slugs, but control has been obtained by methods recommended by the Entomologist. Detailed records of growth and habit are being made.

*Wakefield Pen Experiment.*—The area has been laid out preparatory to planting, which has been delayed by dry weather, and the preparation of the large number of plants required in view of the careful selection that must be given.

*Miscellaneous Manurial Trials.*—The manurial trials are being continued. In all cases where proper attention has been maintained and the plots are not over-shaded, the manured trees are in advance of the unmanured trees.

The Agricultural Officer reports that considerable success has been obtained in forcing backward trees by the use of artificial fertilizer and thus maintaining the grove in a uniform condition of growth.

## Corn.

*Corn Varietal Experiment.*—A varietal Experiment with imported varieties of maize was laid down in St. Thomas in the Vale.

The soil was an inland basin type alluvium, somewhat heavy in texture, and acidic in reaction.

The land was prepared by ploughing with a gyro-tiller and harrowed by a tractor drawn disc-harrow

The experiment was laid out in the form of a Latin Square with the following varieties of imported seeds:—

Golden Glow, Dakota, White Cap, Longfellow, Wisconsin, and two local varieties known as Jamaica Red and Jamaica Hybrid.

The plots were planted by hand during the week ending 24th April, 1937. Immediately after planting there was a short period without rain which delayed germination. By the 14th of May, however, the rains had fallen and there was a good average germination in all the plots.

As soon as the corn was 6 inches high it was damaged considerably by caterpillars. Continuous rains fell during May and June and at times parts of the plot were under water. It was impossible to mould the plants on account of the wet state of the soil. Heavy losses occurred on some plots.

During the first week in June the American varieties began to bear when they were only 18 inches high. By the end of June the whole of the American varieties that had survived the rains were bearing. The cobs were attacked by ear worm, weevil borers, smut, etc. A sample examined by the Assistant to the Entomologist revealed seven different insect pests in addition to smut and other rots.

As the corn had not grown more than 2 feet high in a large part of the experiment and the damage by insect pests had been considerable it was decided to abandon the experiment.

The native varieties tasselled some weeks after the American, but they were destroyed by insect pests. It appeared that the American varieties provided a focal point for the infection.

## Coconut.

The areas in which coconut wilt is serious were visited. The incidence of the disease appears to be greatest where coconuts were growing in unfavourable conditions, but many cases occur where all physiological factors appeared to be favourable.

Two small areas of coconuts were selected between Montego Bay and Lucea by the Departmental field officers of that area. They were treated with artificial manures with a view to determining if the incidence of coconut wilt could be reduced.

A high proportion of the treated trees have since succumbed to the disease. The areas selected were, however, adjacent to severely infested areas. It is therefore possible that the trees in the treated areas, had been infected before treatment or alternatively, they had become infested before the additional nutrient had had material effect on the trees. The trial cannot therefore be considered as being conclusive.

## Land Settlement.

The Agricultural Superintendent attached to this Division has undertaken the inspection of properties offered to the Government for purposes of Land Settlement.

### Advisory Work.

Advice on many problems of diverse nature has been given by the officers of the Division. The main problems submitted concerned the application of artificial manures to crops of all types, and with general crop improvement. Pasture and lawn management, sugar factory problems and irrigation problems are among the many subjects considered.

### Miscellaneous.

The Agricultural Chemist served on a special committee appointed to advise the Government on the Legislation necessrary to give effect in Jamaica to the International Sugar Agreement, and acted as Secretary to the Committee.

The following publications and special reports have been made during the year:—

1. A survey of the Yield of Sugar Cane in Jamaica 1935-36 Crop. Departmental Bulletin by H. H. Croucher.
2. Field Experiments with Sugar Cane 1933-36 Departmental Bulletin by H. H. Croucher.
3. Report on the Vere Irrigation Scheme by H. H. Croucher.
4. Assessing Cane Maturity with the Hand Refractometer J. A. S. T. Quarterly, Vol. 1, No. 1, by H. H. Croucher.
5. A Report on the Deterioration of Dipping Tank Liquid.
6. Contributions have been published in the Bulletin of the Agricultural Society.
7. Lectures on various subjects have been delivered during the year.
8. Twenty-six reports on soil conditions in individual estates have been submitted.

H. H. Croucher,
Agricultural Chemist.

## XV.—*Report of the Botanist.*

I have the honour to submit hereunder my Report for the year ending 31st December, 1937, during which I acted as Plant Pathologist from July 1st to November 7th, besides fulfilling the duties of Government Botanist.

From November 24th to the end of the year I was absent from the Island on leave over which period the Entomologist acted as Government Botanist. I wish to record my gratitude to the Entomologist, Supervising Inspector of Plant Diseases and Assistants of the Botanical Division for the satisfactory manner in which the routine work of the Division was maintained in my absence. For the sake of completeness details of the work carried on in this period are included here below.

2. *Investigations abroad.*—Whilst on leave, the banana breeding work, which constitutes the main activity of this division, was thoroughly reviewed in discussion with the Agricultural Advisor to the Colonial Office and with Professor F. L. Engledow. In particular, the possibilities of obtaining from the East further species of Wild *Musae* immune from Panama Disease for use in breeding, was taken up with the Acting Director and Staff of the Royal Botanic Gardens at Kew and with Mr. R. E. Holttum, Director of the Botanic Gardens, Singapore.

From the 9th to the 24th January I was absent from the Island on a visit to Trinidad during which I deputised for the Director as the Jamaica Representative at the Sixth Meeting of the Advisory Committee to the British West Indies Central Sugar Cane Breeding Station. At the same time the banana breeding work was discussed with Professor E. E. Cheesman of the Imperial College of Tropical Agriculture, with whom close collaboration has for some years been maintained.

Between the 2nd and 19th of July a visit was made to Guatemala and Honduras at the invitation of the United Fruit Company for the purpose of examining the collection of *Musa* species and varieties at Lancetilla, and studying progress in control of *Cercospora musae* on bananas, in connection with my appointment as Acting Plant Pathologist. Separate reports on these tours have been submitted.

3. *Botanical Work.*—With the change of title of the Officer in charge of this Division from Geneticist to Botanist, an increasing influx of enquiries of a botanical nature has been met and dealt with. Such enquiries have been concerned mainly with the identification of Botanical specimens for School Staffs and identification and advice on control of weeds submitted by planters and Field Officers of the Department.

4. *Buildings.*—Owing to the increased output of banana seed and seedlings further greenhouse accommodation was found to be imperative. The existing glass house at the Government Laboratory was therefore extended in November by an additional compartment 20 feet in length.

5. *Staff.*—Mr. L. B. Robinson was appointed temporarily to act as Junior Field Officer attached to this Division, on 4th October, and has been responsible for supervision of work on the breeding plots and seedling nurseries. Mr. D. A. L. Segre continued in his appointment as Technical Assistant to the Division.

### Banana Breeding.

6. *General.*—Breeding policy adopted during the previous few years has in general been continued. The number of crosses undertaken has been kept low in order that each could be carried out on as large a scale as possible. A steady extension of the work has been maintained.

Weather conditions during the year were very satisfactory from the banana breeding point of view. Between November and March in each year some pollinated fruit is always lost as a result of 'Northers' and on occasions too, plants nearing the shooting stage are blown down with the result that early in the ensuing year the number of flowers available for pollination is considerably reduced. At the end of 1936, 8.9% only of the pollinated stems had been blown down, as against 21.4% in 1935, and practically no interruption of the breeding work in the early months of 1937 resulted. (See Table II). During 1937 itself fruit losses from wind were even less, amounting to only 5.8% of the stems pollinated, and these losses were distributed over several of the breeding plots. They occurred at Coleraine on July 30th and in the Castleton district on November 24th.

A summary of the pollinations, etc. is given below in Table I and is computed from January 1st to December 31st. Figures under "Seed obtained" and "Seed germinated" therefore include seed from pollinated fruit unreaped by the end of 1936 and seedlings from some of the seed planted in the previous year. "Seedlings Established" includes only those seedlings planted out in the field. At the end of 1937, there were 295 young seedlings still remaining in seed boxes and pots for planting out during 1938.

TABLE I.

| Year. | Stems Pollinated. | Seed Obtained. | Seed Germinated. | Seedlings Established. |
|---|---|---|---|---|
| Prior to 1933 .. | .. | .. | .. | 52 |
| 1933 .. | 401 | 6 | 1 | .. |
| 1934 .. | 1,472 | 650 | 56 | 1 |
| 1935 .. | 1,957 | 896 | 253 | 81 |
| 1936 .. | 2,260 | 784 | 191 | 172 |
| 1937 .. | 3,132 | 1,686 | 428 | 169 |
| Total .. | 9,222 | 4,022 | 929 | 475 |

A steady increase has been maintained in the number of stems pollinated, a primary consideration as regards the number of seedlings ultimately forthcoming. A disproportional increase in seed yield is due partly to the increase in pollination, partly to favourable weather conditions and partly to the elimination of unfertile crosses from the programme. Germinations have shown a proportional increase and the slight reduction in the number of seedlings established is solely due to the fact that the bulk of the germinations occurred late in the year with the result that there were 200 more young unplanted seedlings at the end of 1937 than at the end of 1936.

The figures given in Table II have been adjusted to represent the actual returns from the stems pollinated in each year. In reference therefore, to 1937 it should be noted that 921 pollinated stems remained to be reaped at the end of the year and these should yield some 600 seed.

TABLE II.

| Year. | Stems Pollinated. | Lost. | Reaped. | Fertile. | Percentage Fertile. | No. of Seed. | Seed per Fert. Stem |
|---|---|---|---|---|---|---|---|
| 1933 .. | 401 | 68 | 333 | 32 | 9.697 | 104 | 3.250 |
| 1934 .. | 1,472 | 64 | 1,408 | 184 | 13.070 | 911 | 4.951 |
| 1935 .. | 1,957 | 418 | 1,539 | 158 | 10.266 | 616 | 3.899 |
| 1936 .. | 2,260 | 201 | 2,059 | 281 | 13.647 | 1,127 | 4.011 |
| 1937 .. | 3,132 | 185 | 2,026 | 398 | 19.644 | 1,265 | 3.178 |

64.7% of the stems pollinated were reaped by the end of the year. A marked increase in the percentage of seminiferous stems occurred but this was to some extent offset by a reduction in the average number of seed borne per fertile stem, neverthless, an increase of seed yield and therefore of potential seedlings, is to be noted.

Two further breeding plots were laid down and came into operation during the year. The existing plots have all been maintained and in several cases extended. No change in pollination technique, as described in the Botanist's report for 1936, have been made.

*Castleton.*—Crosses undertaken here in the past have been continued and a satisfactory output of seed and seedlings maintained. A new plot at Tom's River planted with the *Highgate* variety in 1936 commenced shooting in May and has been actively pollinated since; as the male parent, *M. acuminata* Clone B has been used with very satisfactory results, nearly 50% of the stems pollinated have produced seed (see Table III), over 30% of which has germinated. The second new plot at Gibb's Hill, planted in *Highgate* for crossing with *M. acuminata* Clone A and *Giant Plantain* for crossing with S. 19, came into bearing at the commencement of the year. The results from this plot are also very satisfactory, 40% of the stems have yielded seed with a germination of nearly 20%. It has proven impossible to obtain suckers from the one plant of the wild species, *'Saoma'* which is growing at Gibb's Hill owing to depredations of the Black Weevil Borer, *Cosmopolites sordidus* to which this variety is highly susceptible. The plant, however, shot during June, and being hermaphrodite, was self fertilised and over 20,000 seeds were obtained. These have germinated well and it is hoped to establish the variety for breeding from the seedlings. Several *Highgate* stems were pollinated with *'Samoa'* pollen and one seedling has been raised.

*Coleraine.*—A temporary reduction in pollinations here is due to the replanting of an old breding plot with new seedlings which had not come into bearing by the end of the year. No change in the crosses undertaken has been made. A considerable increase in seed output from Orange Hill has resulted from the partial replacement of S. 19 pollen used for backcrossing to *Gros Michel* by pollen from wild species which have been recently brought into the breeding programme (see para. 7). Seed yield from the backcross has continued to be infinitesimal and does not justify its continuance.

*Crawle.*—No changes in programme or extent of breeding have been made here during the year.

*Grantham.*—This plot has been extended by ¾ acre of *Highgate* bananas which came into bearing in June and have been pollinated with *'Calcutta 4'* one of the new species brought into the breeding work this year. Seed yield from the old cross, *Gros Michel* x *M. acuminata* Clone A has continued satisfactorily. The new cross has so far given little seed.

*Potosi.*—*'Calcutta 4'* pollen has been used on *Gros Michel* since July 15th with good results. This species was planted there on February 19th and came into bearing in five months. *M. sapientum var. brachycarpa* still fails to set seed with Gros Michel there.

*Hope.*—No change in the breeding acreage has been made though the nursery plot has been extended. The backcross of seedlings to the wild type is being continued for reasons previously stated and has yielded 20,000 seed this year. As this cross is unlikely to give seedlings of economic value the figure is omitted from Table III below, which summarises the activities at the various breeding plots during the year.

TABLE III.

*Plot Summary*, 1937.

| Plot. | Stems Pollinated. | Lost. | Reaped. | Fertile. | Seed Yield. | Germinated. |
|---|---|---|---|---|---|---|
| Castleton .. | 230 | 26 | 159 | 42 | 263 | 35 |
| Tom's River .. | 134 | 5 | 64 | 30 | 97 | 36 |
| Gibb's Hill .. | 285 | 6 | 239 | 95 | 358 | 77 |
| Coleraine .. | 270 | 31 | 200 | 26 | 197 | 25 |
| Orange Hill .. | 421 | 67 | 241 | 43 | 160 | 23 |
| Crawle .. | 675 | 9 | 435 | 3 | 21 | 3 |
| Grantham .. | 450 | 11 | 267 | 65 | 147 | 48 |
| Potosi .. | 430 | 27 | 275 | 8 | 22 | 6 |
| Hope .. .. | 237 | 3 | 146 | 86 | .. | .. |
| | 3,132 | 185 | 2,026 | 398 | 1,265 | 253 |
| Immature at 31.12.36 | 774 | 85 | 689 | 117 | 421 | 175 |
| Total .. | 3,906 | 270 | 2,715 | 515 | 1,686 | 428 |

Towards the end of the year it was decided further to increase the output of seedlings by setting up several new breeding plots. With this object, ten suckers of each of two new wild types, *Pisan Lilan* and *Annam* (see para. 10) were planted at Brimmer Hall in St. Mary and New Yarmouth in Vere, respectively, in November, to be crossed with Gros Michel next year.

7. *Breeding Lines.*—Crosses in operation during 1936, have been modified only in detail during the year under review. Certain seedlings breeding with which has proven insufficiently fertile or yielded poor progeny, have been eliminated and replaced by S. 19., *Gros Michel* has to some extent given place of the *Highgate* variety in the initial cross with *M. acuminata* and new wild species have been introduced into the breeding work.

Table IV summarises the crosses in progress and results therefrom during the year. Figures in the last column refer to stems pollinated in 1936 but reaped this year.

TABLE IV.

*Summary of Crosses*, 1937.

| Cross. | Stems Pollinated. | Lost. | Reaped. | Fertile. | Seed obtained | | Seed germinated. |
|---|---|---|---|---|---|---|---|
| | | | | | 1937. | 1936. | |
| J* x M. acum. A. .. | 543 | 11 | 429 | 143 | 315 | 62 | 141 |
| J x M. acum. B. .. | 253 | 15 | 147 | 54 | 134 | 30 | 72 |
| J x M. acum. E. .. | 13 | 1 | 12 | 6 | 10 | .. | .. |
| J x M. sap. brach. .. | 465 | 35 | 364 | 11 | 20 | .. | 2 |
| J x Calcutta-4 .. | 402 | 30 | 110 | 36 | 157 | .. | 27 |
| J x Samoa .. | 8 | .. | 7 | 2 | 4 | .. | 1 |
| J x F1. .. .. | 556 | 37 | 364 | 5 | 13 | 8 | 2 |
| F1 x F1. .. .. | 604 | 41 | 428 | 55 | 612 | 315 | 183 |
| Sundry .. .. | 288 | 15 | 165 | 86 | .. | .. | .. |
| | 3,132 | 185 | 2,026 | 398 | 1,265 | .. | 253 |
| Immature at 31/12/36 | 774 | 85 | 689 | 117 | .. | 421 | 175 |
| Total .. | 3,906 | 270 | 2,715 | 515 | 1,686 | | 428 |

NOTE.—*J. (Jamaica) includes the type, Gros Michel (G.M.) and also Highgate (H), Pink Jamaica (P.J.), Plantain Jamaica (Plt. J.), Weeping Jamaica (W.J.) Gengoffe (G.G,), and Freehill, (F.H.).

Pollination with the clones of *M. acuminata* A, B and E, has been increased and a correspondingly greater output of seedlings has resulted. *M. sapientum* v. *brachycarpa* crossed with *Gros Michel* has failed to give good results. This cross was commenced at Potosi in 1936 and this year was also tried at Castleton and Coleraine on a larger scale. A total of 746 stems have been pollinated and yielded only 25 seeds; two have germinated but neither has survived the seed box stage. Unless better results are forthcoming shortly the cross will be discontinued.

The most noteworthy addition to the programme during the year has been the use of the unidentified wild *Musa* known as '*Calcutta* 4'. This, like *Musa acuminata* is highly fertile but bears small stems with short fingers; unlike *Musa acuminata*, however, its stem hangs vertically and this characteristic, if reproduced in its seedlings should result in more symmetrical fruit. It has been used mainly at Grantham, Orange Hill and Potosi, and to a lesser extent at Coleraine and Crawle. At all these plots excepting Crawle and Coleraine, where the '*Calcutta* 4' did not shoot till late in the year, a good seed yield is being obtained. Its seedlings are still, however, too young to judge of their economic value.

As mentioned above, pollen from another undescribed wild *Musa*, '*Samoa*,' was used to pollinate eight stems of the Highgate variety, seven of which have been reaped and two of which have yielded four seeds giving so far one germination. This seedling has recently been planted out.

*Backcross.*—The backcrossing of F1 seedlings to *Gros Michel* has been continued with as little success as in previous years. From 556 pollinations only two seedlings have been raised. In all, twelve germinations of this cross have taken place, but only six seedlings have survived and though these have fruited, none show any promise either economically or genetically. The cross has proved of little practical value.

The *Highgate* variety has been used more extensively in crossing this year than heretofore in view of the promise shown by seedlings raised from it in 1935. Of the 2,240 pollinations opposite 'J' in Table IV, 573 involve the *Highgate* banana as against a ratio of 1,495 to 219, respectively, in 1936.

Among the sundry crosses are included 28 pollinations of *Giant Plantain* stems by S. 19 pollen of which eight have been reaped. No seed have yet been obtained. This cross was instituted with the object of incorporating the stem and finger size of the *Giant Plantain* in the seedling stock and will be continued.

The F2 cross (F1 x F1 e.g. S. 19 x S. 19) is being increasingly employed and an increase of seed yield of around 80% over the 1936 figure has resulted. Seedlings, such as S. 7, 20, 24, 27, 34, 39, 40, 48, 86, 95, and 118, which have been used to cross with S. 19 prior to this year, are being replaced by S. 19 and S. 17 as only these two have produced any seedlings of promise in their progeny.

8. *Germinations.*—During the year under review 428 seed have germinated of which 253 resulted from 1937 seed and 175 from that of 1936. The bulk of these seedlings arose from the crosses *Gros Michel* and and *Highgate* by *M. acuminata* and S. 19 by S. 19. They are listed below.

| Jamaica x M. acuminata. | | | Backcross. | | |
|---|---|---|---|---|---|
| G.M. x Clone A. | .. | 87 | G. M. x S. 19 | .. | 2 |
| x " B. | .. | 42 | | F2 | |
| P. J. x " B. | | 10 | S. 19 x S. 19 | .. | 165 |
| F. H. x " B. | | 6 | S. 5 x S. 19 | .. | 8 |
| H. x " A. | .. | 54 | S. 17 x S. 19 | .. | 2 |
| x " B. | .. | 14 | S. 24 x S. 19 | .. | 3 |
| | | | S. 39 x S. 19 | .. | 3 |
| | | | S.118 x S. 19 | .. | 1 |
| Jamaica x other spp. | | | S.— x S. 7 | .. | 1 |
| G. M. x *M. brachycarpa* | .. | 2 | | | |
| x Calcutta-4 | .. | 27 | Total | .. | 428 |
| H. x Samoa | .. | 1 | | | |

The total figure compares very favourably with the 191 germinations of last year. Of these 428 germinations, however, 54 died in the seed box stage; 79 have been planted out. Of the 295 remaining, about 100 derived from the original cross, are approximate heptaploids and unlikely to be of any commercial value. Heptaploid seedlings are extremely slow in growth; several planted out in 1935 have not yet shot and show no signs of doing so. This leaves a balance of nearly 200 seedlings of possible value to be planted out early next year.

The percentage germinations of all seed averaged 20.0% as compared with 27.3% for 1936 and 19.3% for 1935.

9. *New Seedlings.*—Besides the 79 seedlings mentioned in the previous paragraph, a further 90, which germinated in 1936, were planted out in the field this year, making a total of 169 as follows:—

| *Jamaica x M. acuminata* | | | *F2.* | | |
|---|---|---|---|---|---|
| G. M. x Clone A. | .. | 31 | S. 19 x S. 19 | .. | 102 |
| x " B | .. | 4 | 7 x 19 | .. | 1 |
| P.J. x " B | .. | 3 | 17 x 19 | .. | 2 |
| H. x " A | .. | 7 | 17 x 20 | .. | 1 |
| x " B | .. | 9 | 24 x 19 | .. | 3 |
| | | | 39 x 19 | .. | 3 |
| | | | 118 x 19 | .. | 1 |
| | | | S. — x 19 | .. | 1 |
| | | | S. — x 7 | .. | 1 |
| | | | Total | .. | 169 |

The majority of the seedlings planted out during 1936 bore fruit this year as did three of the 1937 seedlings planted early in the year; 85 of these stems were reaped and full records kept of their characteristics. It is now becoming possible, therefore, to form a preliminary estimate of the value of some of the crosses on the basis of the seedling fruit, the ultimate criterion. Hitherto, fruit from any one cross had not been available in sufficient quantity to enable this to be done, and the possible value of a cross had to be guaged largely from the vegetative characteristics of its seedlings. Table V analyses the record of the 1937 crop of seedling fruit.

TABLE V.
1937 *Seedlings.*

| Cross. | Seedlings Shot. | Stems Reaped. | To be discarded. | Further trial. | Promising. |
|---|---|---|---|---|---|
| *F1—generation.* | | | | | |
| G. M. x M. acum. A. .. .. | 25 | 12 | 5 | 7 | 3 |
| G. M. x M. acum. B. .. .. | 1 | .. | .. | .. | .. |
| H. x M. acum B. .. .. | 20 | 13 | 2 | 11 | 7 |
| P. J. x M. acum. B. .. .. | 2 | 4 | 1 | 3 | 2 |
| G. G. x M. acum. B. .. .. | 1 | 1 | 1 | .. | .. |
| Misc. .. .. .. | 3 | 3 | 3 | .. | .. |
| *F2—generation.* | | | | | |
| S. 7 x S. 7 .. .. | 4 | 5 | 3 | 2 | 1 |
| 7 x 19 .. .. | 11 | 8 | 7 | 1 | .. |
| 7 x 20 .. .. | 1 | 1 | 1 | .. | .. |
| 20 x 7 .. .. | 4 | 6 | 5 | 1 | .. |
| 19 x 19 .. .. | 5 | 2 | 2 | .. | .. |
| 19 x 17 .. .. | 3 | 2 | 1 | 1 | 1 |
| 17 x 19 .. .. | 2 | .. | .. | .. | .. |
| 19 x 20 .. .. | 1 | 1 | 1 | .. | .. |
| 20 x 19 .. .. | 1 | .. | .. | .. | .. |
| — x 19 .. .. | 13 | 10 | 8 | 2 | .. |
| 17 x 17 .. .. | 1 | 1 | 1 | .. | .. |
| 40 x 7 .. .. | 1 | 1 | 1 | .. | .. |
| — x 40 .. .. | 1 | 1 | 1 | .. | .. |
| Misc. .. .. .. | 11 | 15 | 15 | .. | .. |
| Total .. .. | 111 | 86 | 58 | 28 | 14 |

Of the 86 stems reaped, 33 shot in 1936. A high proportion of the seedlings produce inferior fruit and are of little use either economically or for breeding. These seedlings, however, will be replanted and grown for a second crop before being discarded in order to determine whether they will improve on a different soil type and whether they are resistant to Panama disease. Table V shows that the F1 generation contains a higher proportion of promising seedlings than the F2; this confirms the tentative conclusion reached on last year's results. Of the various F1 seedlings, the *Highgate* derivatives continue to show most promise. The *Highgate* seedlings listed in Table VI are all derived from the cross *Highgate* x *M. acuminata/B.* They are like one another and resemble their female parent in being short in stature, grading well and carrying a large leaf area. They show an improvement over earlier seedlings in that the 'stems' are more vertical, and thus more symmetrical, and that the petioles are shorter and stouter and thus less susceptible to wind damage.

TABLE VI.
1937 *Selections.*

| Cross. | Variety. | Number of Stems. | Weight (lbs.-ozs.) | Hands | Fingers per Hand. | Finger weight (gms.) | Finger length (ins.) |
|---|---|---|---|---|---|---|---|
| — | Gros Michel .. | 12 | 45–15 | 7.5 | 15.0 | 155.4 | 6.72 |
| — | Highgate .. | 10 | 51–8 | 9.1 | 15.2 | 153.7 | 6.07 |
| — | S. 19 .. | 10 | 28–13 | 6.5 | 14.4 | 114.4 | 5.69 |
| H x K | J. 163 .. | 3 | 30–15 | 6.3 | 15.5 | 112.5 | 5.13 |
| " | J. 225 .. | 2 | 24–2 | 8.0 | 14.9 | 74.9 | 4.65 |
| " | J. 227 .. | 1 | 35–4 | 6.0 | 16.0 | 145.0 | 5.71 |
| " | J. 234 .. | 1 | 46–7 | 8.0 | 16.7 | 137.9 | 5.76 |
| " | J. 284 .. | 1 | 29–3 | 7.0 | 12.0 | 126.7 | 5.65 |
| " | J. 285 .. | 1 | 40–8 | 8.0 | 16.1 | 120.4 | 5.38 |
| " | J. 305 .. | 1 | 32–2 | 7.0 | 15.0 | 119.3 | 5.34 |
| J x ZA | J. 180 .. | 1 | 34–4 | 7.0 | 14.3 | 126.3 | 5.49 |
| " | J. 194 | 1 | 28–14 | 8.0 | 12.9 | 104.0 | 5.98 |
| " | J. 235 .. | 1 | 24–13 | 6.0 | 13.8 | 110.7 | 5.57 |
| PJ x K | J. 151 .. | 1 | 39–4 | 9.0 | 16.0 | 106.9 | 4.87 |
| " | J. 221 .. | 1 | 31–14 | 8.0 | 15.0 | 102.6 | 5.03 |
| S7 x S7 | J. 220 .. | 1 | 22–10 | 6.0 | 13.0 | 105.2 | 6.13 |
| S19 x S17 | J. 228 .. | 1 | 51–0 | 8.0 | 15.5 | 156.7 | 5.92 |

The above figures need little explanation. Many of these seedlings compare favourably in weight, grade and number of fingers with *Gros Michel.* As a rule, however, the fingers tend to be from ½ to 1½ inches shorter and correspondingly lighter. Of the long fingered seedlings, J. 194, 220 and 228 are worthy of mention, though the first two carry only 13 fingers to the hand and the fingers though relatively long are

thin and light. On the other hand the *Highgate* seedlings tend to bear fingers which are short and plump. In view of the small number of seedlings of these crosses which have shot, the results cannot but be regarded as promising and it is possible that an F2 generation from such as these and from intercrosses between them will yield still better seedlings. Those seedlings listed as promising are mostly still in the single stool stage and are being grown principally for suckers, this has possibly had a detrimental effect on the finger length. Before a final opinion can be given, sufficient suckers must be developed to enable plots to be laid out for cultivation under estate conditions.

Of the promising seedlings of 1936, J. 202, 203, and 208 have yielded further fruit and again justified their selection. They, with the other 1936 seedlings, are in process of being bulked.

10. *Plant Introductions.*—Resulting from the visit of the Botanist to Trinidad in January two new unidentified wild *Musa* species have been added to the collection of male parents; these are *Annam* and *Pisan Lilan* of which three and four suckers, respectively, were received from the Plant Quarantine Station, Trinidad on April 13th. These both show resemblances to the clones of the *M. acuminata* already in use but possess possible advantages from the breeding point of view. Both have a sturdier habit of growth than either *M. acuminata* A or B and *Pisan Lilan* is in addition female sterile and parthenocarpic, a characteristic commercially valuable which could profitably be introduced into the seedling stock. These two, as mentioned above in para 6, have already been planted out to be used for breeding next year.

As a result of the visit to Central America in July suckers of 11 new wild types have been introduced. Seven of these approach *M. sapientum*, if not actually belonging to that species, and may prove more fertile with *Gros Michel* than the variety which has hitherto been used, namely, *M. sapientum* v. *brachycarpa*. Of the remainder two are more closely related to *M. acuminata*. Seed of two other varieties, *Sinabā* and *Coolie Hongkseng* were obtained, planted and have germinated well. The consignment also included two varieties of *M. textilis*. These are growing under close observation and will be used for breeding should any prove suitable. I am indebted to the United Fruit Company for affording the opportunity of examining their collection of banana varieties at Lancetilla and for the gift of material of these varieties.

Search for variant forms of *Gros Michel* is being continued, though no new forms have come to light recently. Of the five under test at the end of 1936 one, as then reported, proved to be a variant form of *Gros Michel*, one the variety known as Rubra (Green Red) another the Lacatan, and the remaining two have not yet shown any significant differences from the *Gros Michel*.

11. *Musa Cytology.*—Owing to the various extraordinary duties which devolved upon the Botanist during 1937, in particular, tours abroad and activities in connection with Plant Pathological work, it became necessary to suspend the cytological work in hand. Nevertheless 183 cytological fixations were made for examination of both somatic and meiotic processes in the seedlings. It is hoped that it will be possible to resume this work shortly.

## Banana Field Trials.

12.—*Variety Trials.*—Suckers of seedlings showing sufficient promise for extended trial were not available during the year in sufficient quantity for the laying down of variety trials, but it should be possible to commence such trials in 1938.

Owing to the increased output of seedlings and space required for bulking, it has been necessary to set up further nursery plots. Planting was commenced on a 5 acre plot at New Yarmouth towards the end of the year and one-third acre of new land at Hope was opened up in April. A 2-acre plot also at Hope, in old seedlings of doubtful parentage which had been retained for cytological study was cleared and is being used as a nursery for new seedling. Much of the bulking of seedling varieties is being carried out on diseased land at the same time as they are being tested for resistance to Panama Disease, as detailed in last year's report.

The 3-acre extension of S. 19 plantings at Coleraine, to supply fruit for cold storage research has borne well. The plant crop was used for breeding but the ratoons will be used for cold storage experimentation. On March 1st, three, 1 acre plots were planted in S. 19 at Borobridge, Guys Hill and Chepstowe, also to supply fruit for cold storage. All three were shooting by the end of the year. Good fruit was obtainable from Borobridge, but the other two plots were producing very poor fruit. These two will probably be enlarged and used for breeding in 1938, under the extension scheme referred to in para. 6 above.

The 3-acre seedling nursery plot at Caymanas was abandoned in March. The soil type and system of cultivation there proved unsuited to the purpose as it has been found that many of the seedlings do not thrive on very light soil under irrigation.

The *Giant Governor* variety, of which 12 suckers were obtained from Trinidad in 1934, has been increased to 300 plants which were set out in November; these are to be grown under estate conditions and the fruit tested for shipping qualities.

Though the cold storage experiments with the *Cavendish* variety have been completed for the time being a reserve plot of two acres at Coleraine is being maintained, should a further supply of suckers be required.

13. *Panama Disease Tests.*—The technique developed last year for testing seedlings for resistance to Panama disease, by which seedling suckers are planted in holes from which disease *Gros Michel* plants have recently been removed, has been continued and has proven satisfactory. To cope with the number of varieties which will become available for test next year a further 3-acre plot of heavily infected land at Orange Hill was planted with *Gros Michel* in May. Records of the diseased plants are kept, and by the end of the year over 16% of the holes were shown to be infected. It is expected that by the middle of 1938 the disease will have attacked at least 70% of the plants. These loci will be available for testing seedlings in 1938. A similar 2-acre plot is in use at Coleraine and a smaller one, 1/5 acre at Hope.

Of the 25 seedlings which were planted in the test plots at Coleraine and Hope in 1936 (listed in the Report for that year) none have shown signs of disease and are in all probability immune. During the year under review, 74 more seedlings were included in this test as follows:—

TABLE VII.

*Seedlings undergoing P. D. test.*

| Cross. | | | Seedlings. | Total. |
|---|---|---|---|---|
| H | x | K* | J. 163, 208, 211, 225, 227, 234, 241, 284 .. .. | 8 |
| J | x | ZA* | 180, 194, 219, 229, 235, 237, 244, 245, 249, 284 .. | 10 |
| PJ | x | K | 213, 221 .. .. .. .. .. | 2 |
| *Fill | x | K | 146, 159 .. .. .. | 2 |
| 7 | x | 7 | 121, 130, 133, 136, 166, 170, 192, 220, 223 .. .. | 9 |
| 7 | x | 19 | 150, 190, 207. 216, 222, 233, 280 .. .. | 7 |
| 17 | x | 7 | 137 .. .. .. .. .. | 1 |
| 17 | x | 17 | 251 .. .. .. .. .. | 1 |
| 19 | x | 17 | 228, 236 .. .. .. .. | 2 |
| 19 | x | 19 | 125, 167, 178, 250 .. .. .. .. | 4 |
| 5 | x | 7 | 161 .. .. .. .. | 1 |
| 20 | x | 7 | 129, 138, 172, 182, 186, 281 .. .. .. | 6 |
| 40 | x | 7 | 157 .. .. .. .. | 1 |
| S. | x | 19 | 196, 204, 217, 231, 264 .. .. .. | 5 |
| 95 | x | 29 | 212 .. .. .. .. .. | 1 |
| 5 | x | K | 153, 177, 181, 198, 200, 232, 257, 259, 261 .. .. | 9 |
| 7 | x | K | 279 .. .. .. .. .. | 1 |
| H | x | R?* | 193 .. .. .. .. .. | 1 |
| 5 | x | R? | 205 .. .. .. .. .. | 1 |
| 7 | x | R? | 171 .. .. .. .. .. | 1 |
| 20 | x | R? | 132 .. .. .. .. .. | 1 |
| | | | | 74 |

NOTE.—*(K)—*M. acuminata/B.* (R)—Robusta
(ZA)—*M. acuminata*/A. (Fill)—Fillbasket.

By the end of the year two of these, J. 137 and J. 161 had become diseased. Both were planted on April 2nd and neither exhibited any symptoms until December 6th. It is essential, therefore, that such tests should be carried on for at least a year before any certainty of a seedling's resistance can be assured. It should be noted that the parents of J. 137, S. 7 and S. 17 are both immune; this is important in that it suggests that immunity is dominant to susceptibility, and that a high proportion of the seedlings from the crosses in hand, possibly as many as 75% will be resistant if not immune. J. 161 on the other hand had one susceptible parent, S. 5.

## PAWPAW SELECTION.

14. Testing varieties of *Carica papaya* and other species of the genus for resistance to mosaic disease with a view to discovering a suitable parent for breeding, has been continued. Two further types have been received during the year, *C. quercifolia* and a variety of *Carica papaya* from Brazil and these have been included in the test. In the following list the first seven forms, received in 1936, are included as testing them had not been completed by the end of that year.

| Variety. | Source. | Reaction to Mosaic. |
|---|---|---|
| C. candamarcensis .. | Ecuador | (Died.) |
| C. chrysopetala .. .. | " | ( " ) |
| C. pubescens .. .. | Guatemala | Resistant. |
| C. dolecaula .. .. | " | Susceptible. |
| C. zapota .. .. | " | " |
| C. sp. (? C. posospora) .. | Honduras | " |
| C. papaya .. .. | " | " |
| C. quercifolia .. .. | Brazil | " |
| C. papaya .. .. | " | " |

The above test was carried out at Hope where sufficient natural infection is available. The climate was unsuitable for some of these forms and *C. candamarcensis* succumbed. *C. chrysopetala* was killed by attack of the eelworm, *Heterodera marioni*. *C. pubescens* which was planted on March 16th had shown no signs of the disease by the end of the year, by which time all the susceptible forms were severely diseased. This species and *C. cauliflora* appear to be sufficiently resistant to the disease to merit their use in breeding. No forms of *C. papaya*, of which many have been tested previously, have shown any signs of resistance to mosaic.

15. *Breeding.*—The disease test plot was planted adjoining a plot in two commercial varieties of *C. papaya* and numerous crosses were made between these and *C. cauliflora* and *C. pubesecens*. Most of the other wild forms succumbed before flowering. Pollinations were commenced in February at which time the weather was very dry and windy but no fruit were set, even from intercrosses between *C. papaya* varieties. Pollinations were resumed in May and carried out as a rule on still, overcast days with considerably better results. All the pollinated fruit was reaped by the end of the year. Fruit set as follows:—

| Cross. | | Number of flowers pollinated. | Number of fruit set. |
|---|---|---|---|
| C. papaya | x C. papaya .. .. | 40 | 33 |
| | x C. cauliflora .. .. | 8 | 4 |
| | x C. pubescens .. .. | 2 | .. |
| C. cauliflora | x C. cauliflora .. .. | 8 | 4 |
| | x C. zapota .. .. | 4 | .. |
| | x C. pubescens .. .. | 4 | .. |
| C. pubescens | x C. cauliflora .. .. | 3 | 3 |
| | x C. pubescens .. .. | 6 | 5 |
| | x C. zapota .. .. | 3 | .. |
| | x C. dolecaula .. .. | 5 | .. |
| C. chrysopetala | x C. cauliflora .. .. | 5 | .. |
| | x C. zapota .. .. | 5 | .. |
| | x C. dolecaula .. .. | 5 | .. |
| | x C. pubescens .. .. | 7 | .. |

There is evidently a considerable degree of interspecific incompatibility the chief exception to which is the cross *C. pubescens* x *C. cauliflora*. Although the cross *C. papaya* x *C. cauliflora* set four fruit, this fruit was very small and only two contained a few apparently good seed. The F1 generations will be raised during 1938 and breeding continued.

## Plant Pathology.

16. During the period in which I acted as Plant Pathologist, from July 1st to November 7th, the activities of that Division were mainly concerned with the Leaf Spot of Bananas caused by *Cercospora musae* and its control. In 1936 the disease became distributed in more or less isolated patches throughout the main banana growing areas in the centre and West end of the Island. During the early half of 1937, the driest months of the year, the disease in its more serious form abated somewhat as had been expected. By the commencement of August, however, it was observed that whilst a few areas of intense infection were noticeable there had been a considerable spread of the disease in a mild form around the areas of high infection, particularly in fields of young plants. With few exceptions, fruit loss had only occurred in areas where soil was poor and only poor fruit was grown in normal conditions. In the irrigated areas on the Southern plain, with the exception of parts of St. Catherine the disease had continued to be active and periodical spraying with Bordeaux mixture had been necessary to keep it under control. By the middle of October, following upon the October and earlier rains the disease had made a widespread reappearance, particularly in St. James, Upper Clarendon, Upper Manchester, and West St. Catherine, but outbreaks were still confined to localities in which such outbreaks had occurred in the previous year. In irrigated areas in the south where planters were endeavouring to spray regularly, the disease had been aggravated by interruption of the spraying schedule by rainy weather. In Eastern St. Mary, Portland and St. Thomas the disease had still not appeared to any extent by the end of November. Loss of fruit had only occurred in highly infected areas in districts where spraying could not be carried out.

17. *Control.*—Numerous areas were visited and planters advised on methods of control and many requests for advice were dealt with by correspondence. Where water was available and topography permitted, spraying with Bordeaux mixture was advised and on hillsides where marketable fruit was being produced, dusting with copper sulphate—lime dust. On exposed denuded ridges where infection was often severe and poor fruit was normally produced control was uneconomic and destruction of affected plants the only adoptable measure, such areas were fortunately limited. Early on, planters were advised to remove the lower heavily infected leaves, but this measure proved ineffective in reducing foci of infection sufficiently to justify continuance.

18. *Control Experiments.*—Six experiments designed primarily to devise an efficient method of curtailing Banana Leaf Spot, at a lower cost than the established routine involved, were in progress in three infected areas at the end of the period under review. Two of these had been in progress since early in the year, a further three was set up in August and one in November. Fungicides used were copper sulphate and cuprous oxide in the forms of sprays and dust. The quantity, concentration and interval between applications were varied, on a randomised plot layout. By November it was found necessary to continue these experiments for a further period before results of sufficient reliability to justify recommendations to planters would be forthcoming. A report on the results at that time has already been submitted and will not be reiterated here.

Owing to the occupation by the planting community generally with the control of Banana Leaf Spot few enquiries relating to other recurrent diseases such as Pimento Rust, Panama Disease and Coconut Wilt, etc., were received. Facilities were given for testing out a reported cure for Panama Disease, but the experiment proved unsuccessful.

A hitherto unrecorded affection of bananas was reported from lower St. Catherine and investigated. In isolated patches of young plants the apical growing point was found to have split longitudinally in the early stages of growth with the result that the half grown pseudostem contained two growing shoots. No explanation was found though it is possible that the condition was induced by some abnormal physiological condition in the early stages of growth possibly brought about by excessive manuring or other unusual soil condition. It is unlikely that the trouble was due to mutation as the affected suckers had been derived from various sources.

Coconut Wilt which had been serious in St. James and Hanover during the latter half of 1936 had abated somewhat in severity though new cases were still being reported in November.

Numerous diseased specimens were submitted for advice, among which were:—

| | | |
|---|---|---|
| Citrus .. | .. | affected by Scab, Scale Insects, Capnodium, Spray injury, Gleosporium, limetticolum, (on limes). |
| Maize .. | .. | affected by Ustilago zeae. |
| Podocarpus falcatus (Yacca) | | affected by Pestalozzia funerea. |
| Irish potatoes | .. | affected by Fusarium oxysporium (Storage rot). |
| Annatto | .. | affected by Rosellinea necatrix. |
| Chrysanthemum | .. | affected by Physiological necrosis. |
| Tobacco .. | .. | affected by Nitrogen deficiency. |
| Murraya | .. | affected by Physiological wilt. |
| Cane .. | .. | affected by Helminthosporium sacchari. |
| Roses .. | .. | affected by Mildew. |

19. *Miscellaneous.*—The following special reports were made during the year:—

Report on a Visit to Trinidad.
Report on a Visit to Central America.
Interim Report on Banana Leaf Spot Control Experiments.
Report on a case of Twinning in Bananas.

Various reports in connection with the enforcement of Panama Disease regulations, and on certain aspects of Banana Breeding.

The Staff Conference held at Hope on February 5th and 6th was attended and a brief account of progress in Banana Breeding was given.

One meeting of the Advisory Board on the Sugar Industry was attended when an account was given of the Trinidad meeting of the Advisory Committee on the British West Indies Central Sugar Cane Breeding Station.

Two tours of the Island were made in July and October to examine the Banana Leaf Spot situation. Reports on these tours were submitted.

In conclusion I desire to express my appreciation to the planters who have so generously afforded facilities for carrying out the Banana Breeding Experiments, to the Field Officers of the Department and the Assistants to the Plant Pathological Division for their willing co-operation during my appointment as Acting Plant Pathologist.

L. N. H. Larter,
Government Botanist.
17.5.38.

## D.—Publications.

The following Departmental publications were issued during the year:—

Bulletin No. 9 (New Series)—"Field Experiments on Sugar Cane in Jamaica 1933-1936" by H. H. Croucher.
Bulletin No. 10 (New Series)—"The Damage Done in the Kingston and St. Andrew Area by Termites which infest Buildings" by W. H. Edwards.
Bulletin No. 11 (New Series)—"A Survey of the Yields of Sugar Cane in Jamaica 1935-1936" by H. H. Croucher.
Bulletin No. 12 (New Series)—Reprints of Miscellaneous Articles—1936.
Bulletin No. 15 (New Series)—"Cercospora Leaf Spot of Bananas" by F. S. Ward.
Annual Report 1936.

## B. Accounts of the Hope Stock Farm.

### Hope Stock Farm, Year ended 31st December, 1937.—Cash Appropriation.

| Receipts. | £ s. d. | Approved Estimates. £ | Actual. £ s. d. |
|---|---|---|---|
| Balance on 31.12.36 | .. | 2,460 | 2,460 11 6 |
| Milk Sales | .. | 5,500 | 5,843 5 0 |
| Butter Sales | .. | 100 | 111 14 4 |
| Live Stock Sales | .. | 100 | 209 7 0 |
| Poultry Sales | .. | 30 | 30 8 7 |
| Rents | .. | 200 | 265 9 0 |
| Bombay Mango Sales | .. | 550 | 571 14 11 |
| Miscellaneous:— | | | |
| Interest | 24 14 2 | | |
| Stud Fees | 12 6 0 | | |
| Truck (Reimbursements) | 70 16 0 | | |
| Food for Stock (Reimbursements) | 288 5 10 | | |
| Stores and Parts (Sales) | 31 11 3 | | |
| Furniture and Fixtures (Sales) | 1 4 6 | | |
| Sundries | 120 17 6 | 200 | 549 15 3 |
| | | 9,140 | 10,042 5 7 |
| Jamaica Government Advance o/a purchase of "Hope Pasture" | .. | .. | 2,600 0 0 |
| | | | £12,642 5 7 |

| Disbursements. | £ s. d. | Approved Estimates. £ | Actual. £ s. d. |
|---|---|---|---|
| *Personal Emoluments*— | | | |
| Accountant | .. | 150 | 150 0 0 |
| Cashier | .. | 140 | 140 0 0 |
| Farm Superintendent | .. | 50 | 50 0 0 |
| Assistant Master-in lieu of Commission on Fruit Sales | .. | 50 | 25 0 0 |
| Contributions to Pensions | .. | 26 | 25 10 0 |
| Foreman | .. | 165 | 165 0 0 |
| Wages | .. | 1,500 | 1,562 11 4 |
| Rent Commission | .. | 20 | 26 11 0 |
| Fruit Commission | .. | 15 | 9 5 6 |
| Clerk and Storekeeper | .. | 125 | 121 11 4 |
| *Other Charges*— | | | |
| Food for Stock:— | | 2,241 | 2,275 9 2 |
| Growing Canes | 102 13 6 | | |
| Growing Guinea Corn | 83 8 7 | | |
| Manufacturing Guinea Corn Silage | 111 14 11 | | |
| Poultry Feed | 42 9 10 | | |
| Imported and Other Feeds | 1,774 17 4 | 1,700 | 2,115 4 2 |
| Rearing Calves | .. | 2 | .. |
| Cleaning and Fencing | .. | 600 | 618 2 1 |
| Buildings, Machinery and Equipment— | | | |
| Buildings | 407 18 1 | | |
| Machinery | 9 18 1 | | |
| Furniture and Fixtures | 43 9 6 | | |
| Stores and Parts | 26 6 0 | | |
| Vehicles and Harness | 149 9 3 | | |
| Tools and Implements | 83 15 1 | | |
| General Repairs | 288 6 5 | 1,500 | 1,009 2 5 |
| Purchase of Live Stock | .. | 450 | 137 3 9 |
| Reimbursement to Treasury o/a Purchase of Hope Pastures—with Interest | .. | 1,288 | .. |
| New Stables at Grove Place | .. | 283 | 371 7 8 |
| Miscellaneous:— | | | |
| Truck Working A/c | 182 19 1 | | |
| Rents (Expenses) | 1 0 3 | | |
| Bombay Mango Expenses | 64 3 9 | | |
| Butter Expenses | 6 19 9 | | |
| Poultry Expenses | 6 1 6 | | |
| Taxes | 7 18 0 | | |
| Sundries | 300 14 6 | 550 | 569 16 10 |
| | | £8,614 | £7,096 6 1 |
| Purchase of Hope Pastures | .. | .. | 3,608 0 0 |
| Balance: In Bank Nova Scotia | 1,292 9 8 | | |
| In Government Savings Bank | 645 9 10 | | 1,937 19 6 |
| | | | £12,642 5 7 |

A. C. Barnes, Director of Agriculture.

N. B. Donaldson, Accountant.

## Hope Slock Farm, Year ended 31st December, 1937.

### Profit and Loss Account.

Dr. Cr.

| | £ s. d. | £ s. d. | | £ s. d. |
|---|---|---|---|---|
| To Depreciation: | | | By Rents .. .. | 237 7 9 |
| Buildings .. .. .. | 155 7 11 | | Bombay Mangoes .. | 497 14 5 |
| Machinery .. .. .. | 102 5 10 | | Milk .. .. | 5,891 13 8 |
| Furniture and Fixtures .. .. | 68 1 7 | | Butter .. .. | 93 5 5 |
| Truck .. .. .. | 30 0 0 | | Interest (Bank) .. .. | 28 0 0 |
| Tools and Implements .. .. | 40 14 8 | | Stud Fees .. .. | 12 6 0 |
| Vehicles and Harness .. .. | 32 4 9 | | Miscellaneous Receipts .. | 27 4 11 |
| Stores and Parts .. .. | 0 5 0 | 428 19 9 | | |
| Repairs and Upkeep: | | | | |
| Buildings .. .. .. | 154 10 2 | | | |
| Machinery .. .. .. | 35 17 10 | | | |
| Furniture and Fixtures .. .. | 16 8 9 | | | |
| Tools and Implements .. .. | 20 11 3 | | | |
| Vehicles and Harness .. .. | 147 5 3 | | | |
| General .. .. .. | 259 4 4 | 633 17 7 | | |
| Truck (running expenses) .. | .. | 114 13 11 | | |
| Food for Stock (consumed) .. | .. | 1,835 11 3 | | |
| Taxes .. .. .. | .. | 7 18 0 | | |
| Cleaning and Fencing .. | .. | 649 17 1 | | |
| Wages .. .. .. | .. | 1,437 11 4 | | |
| Accountant .. .. .. | .. | 150 0 0 | | |
| Cashier .. .. .. | .. | 140 0 0 | | |
| Foreman .. .. .. | .. | 165 0 0 | | |
| Farm Superintendent .. .. | .. | 50 0 0 | | |
| Contribution to Pensions .. | .. | 25 10 0 | | |
| Clerk and Storekeeper .. .. | .. | 121 11 4 | | |
| Assistant .. .. .. | .. | 100 2 11 | | |
| Assistant Master (in lieu of commission on fruit sales .. .. | .. | 25 0 0 | | |
| Knutsford Park Show Expenses .. | .. | 26 11 6 | | |
| Poultry .. .. .. | .. | 32 16 5 | | |
| Live Stock .. .. .. | .. | 109 14 8 | | |
| Miscellaneous Expenses .. .. | .. | 213 0 5 | | |
| Balance: Net Profit for the year .. | .. | 519 16 0 | | |
| | | £6,787 12 2 | | £6,787 12 2 |

A. C. Barnes, Director of Agriculture.

N. B. Donaldson, Accountant.

HOPE STOCK FARM, YEAR ENDED 31ST DECEMBER, 1937.

BALANCE SHEET.

*Assets.*

| | £ s. d. | £ s. d. |
|---|---|---|
| **Buildings—** | | |
| As at 31.12.36 .. | 4,785 10 2 | |
| Additions .. .. | 253 7 11 | |
| | 5,038 18 1 | |
| Depreciation .. | 155 7 11 | 4,883 10 2 |
| **Machinery—** | | |
| As at 31.12.36 .. | 957 4 11 | |
| Depreciation .. | 102 5 10 | 854 19 1 |
| **Furniture and Fixtures—** | | |
| As at 31.12.36 .. | 1,039 3 9 | |
| Additions .. .. | 34 12 4 | |
| | 1,073 16 1 | |
| Depreciation .. | 68 1 7 | 1,005 14 6 |
| **Truck—** | | |
| As at 31.12.36 .. | 180 0 0 | |
| Depreciation .. | 30 0 0 | 150 0 0 |
| **Tools and Implements—** | | |
| As at 31.12.36 .. | 252 9 10 | |
| Additions .. .. | 63 0 10 | |
| | 315 10 8 | |
| Depreciation .. | 40 14 8 | 274 16 0 |
| **Vehicles and Harness—** | | |
| As at 31.12.36 .. | 220 7 0 | |
| Additions .. .. | 2 4 0 | |
| | 222 11 0 | |
| Depreciation .. | 32 4 9 | 190 6 3 |
| **Stores and Parts—** | | |
| Stock as per Inventory .. | .. | 111 6 3 |
| **Food for Stock—** | | |
| Stock as per Inventory .. | .. | 749 8 6 |
| **Live Stock—** | | |
| Cattle and Horsekind .. | 7,119 10 0 | |
| Poultry .. .. | 52 14 0 | 7,172 4 0 |
| **Accounts Receivable—** | | |
| Public Hospital .. | 292 3 9 | |
| Jubilee Hospital .. | 33 16 7 | |
| Tuberculosis Hospital .. | 33 8 0 | |
| General Penitentiary .. | 23 15 6 | |
| Lunatic Asylum .. | 162 13 7 | |
| Farm School .. | 8 2 11 | |
| Hon. A. C. Barnes .. | 0 11 6 | |
| Hon. Major T. Hallinan | 0 15 6 | |
| J. W. Howe .. .. | 1 0 10 | |
| E. Downes .. .. | 1 6 11 | |
| G. E. Redshaw .. | 0 2 4 | |
| W. T. Domville .. | 0 1 3 | |
| H. Miller .. .. | 2 3 7 | |
| H. C. Virtue .. | 0 3 6 | |
| Government Laboratory | 1 5 0 | |
| Hope Gardens .. | 1 17 6 | |
| O. W. Harrison .. | 0 6 1 | |
| I. Tomlinson .. .. | 0 15 8 | |
| Hope Gardens Transport | 2 19 8 | |
| C. Hope Panton .. | 4 10 0 | |
| O. L. Crichton .. | 0 0 4 | |
| K. A. Gayle .. .. | 0 12 2 | |
| J. McDonald .. | 0 13 11 | |
| Dr. G. E. W. Finzi .. | 0 7 9 | |
| Miss E. J. Gordon .. | 0 7 1 | |
| H. McGrath .. | 0 4 0 | |
| Mais, Thomson and Robertson | 0 13 9 | |
| J. Loza .. .. | 0 6 0 | |
| Dr. O. D. Witter .. | 0 14 9 | |
| K. A. Wilson .. | 0 2 6 | 576 1 11 |
| **Hope Pastures** .. .. | .. | 3,658 0 0 |
| **Jamaica Government Advance** o/a New Stables, Grove Place .. | | 255 13 9 |
| **Government Savings Bank "Deposit A/"c** | | 645 9 10 |
| **Accured Interest (on Deposit A/c)** .. | | 3 5 10 |
| Bank of Nova Scotia "Current A/c" .. | | 1,292 9 8 |
| | | £21,823 5 9 |

*Liabilities.*

| | £ s. d. | £ s. d. |
|---|---|---|
| **Deposits—** | | |
| W. B. Dixon .. | 0 0 1 | |
| H. M. A. S. Australia | 0 4 9 | |
| Ansley Webster .. | 0 9 0 | 0 13 10 |
| **Accounts Payable—** | | |
| Treasurer for New York Agents .. | 317 12 6 | |
| Treasurer for Crown Agents .. | 40 7 10 | 358 0 4 |
| **Jamaica Government—** | | |
| Loan o/a purchase of Hope Pastures .. | .. | 2,600 0 0 |
| **Profit and Loss—** | | |
| As at 31.12.36 .. | 18,344 15 7 | |
| Add profit for the year | 519 16 0 | 18,864 11 7 |
| | | £21,823 5 9 |

A. C. BARNES, Director of Agriculture.

N. B. DONALDSON, Accountant.

## Section IV—Legislation affecting Agricultural Industries.

*A. Laws relating to Agriculture passed during the year* 1937.

| Law No. | Date Assented to. | Short Title. | Chief Provision: |
|---|---|---|---|
| 3 | 9th Feb., 1937 .. | The Rum Control Amendment Law, 1937 | Provides for the establishment of a Rum Control Board to enquire into and deal with matters in relation to the manufacture of rum in the Island and the sale of Pool Rum. |
| 16 | 7th Feb., 1937 .. | The Banana Industry Aid (Amendment) Law, 1937. | Extending the provisions of Sections 29 and 30 of the Banana Industry Aid Law, 1935, to The Banana Industry Aid Laws, 1932 and 1933. |
| 30 | 13th Feb., 1937 .. | The Coconut Industry Aid Amendment Law, 1937 | Lowers the excess duty on edible oil from 9d. to 3d. per gallon and provides for regulation of quantity of oil manufactured under licence. |
| 32 | 13th July, 1937 .. | The Sugar Industry Control Amendment Law, 1937 | Amending the Sugar Industry Control Law, 1933, by providing that no sugar of any kind shall be exported from Jamaica except under licence granted by the Collector General. |
| 42 | 29th Dec., 1937 .. | The Forest Law, 1937 | Provides for the protection and management of forests. |
| 43 | 29th Dec., 1937 .. | The Sugar Industry Control Law, 1937 | Provides for (i) the appointment of a Sugar Control Board.<br>(ii) the Restriction on Importation of Sugar and Prohibition of Exportation of Muscovado Sugar.<br>(iii) fixing of Island Quotas and Excise Duty.<br>(iv) the controlling of Sales of Sugar for Local Consumption.<br>(v) the granting of Manufacturer's Quota and Export Licences.<br>(vi) the Registration and Licensing of Cane Farmers.<br>(vii) the establishment of Arbitration Authority. |

B. *Order, Rules, etc., relating to Agriculture published during the year*, 1937.

| Date. | Description. | Subject. |
|---|---|---|
| 21st Jan., 1937 | Notice under Law 23 of 1916. | Transhipmnet of Citrus from Spanish Honduras and British Honduras at Port of Kingston allowed under specified conditions. |
| 21st Jan., 1937 | Proclamation under Law 23 of 1916 | Prohibiting the importation of Contagious abortion vaccine, live or dead (organisms of the Brucella group), rabies vaccine, foot and mouth disease and contagious bovine pleuro-pneumonia vaccine or antigen. Also all specific organisms or agents (of a bacterial, protozoan and virus nature) except rat viruses, which are known to cause infectious animal diseases. If intended for use in the practice of human or veterinary medicine importation may be permitted under specified conditions. |
| 26th Jan., 1937 | Order under Law 19 of 1926 | Regulations for the export of Unmanufactured Tobacco. |
| 9th April, 1937 | Proclamation under Law 23 of 1916 | Prohibiting the importation of all alcohols whether denatured or not exceeding 50% of alcohol by weight except imported by or on behalf of the Government. |
| 17th May, 1937 | Order under Law 31 of 1933 | Fixing percentage of sugar manufactured in Island to be exported at 87½% and percentage for local consumption 12½%. |
| 13th July, 1937 | Notice under Law 30 of 1937 | Fixing rate of duty payable on edible oil mnaufactured in the Island at 3d. per gallon. |
| 7th August, 1937 | Regulations under Law 3 of 1937 | Setting out procedure in case of (i) an Appeal to the Governor in Privy Council (ii) Complaints to the Board (iii) Appeal from the Board to the Governor in Privy Council. (iv) Application to Governor in Privy Council for approval of any modification or alteration of any existing agreement or of any new agreement. |
| 31st August, 1937 | Proclamation under Law 23 of 1916 | Revoking Proclamation of 9/4/37, and Prohibiting the importation of all Ethyl Alcohol, Methyl Alcohol and Propyl Alcohol whether denatured or not, exceeding 50% of alcohol by weight except such as may be imported by or on behalf of the Government and save and except tinctures of the British Pharmacopœia and no United States Pharmacopœia and perfumes. |
| 14th Sept., 1937 | Order under Law 19 of 1926. | Rescinding the Regulations governing the exportation of vegetables and fruits and making Regulations in substitution. |
| 14th Sept., 1937 | Order under Law 19 of 1926 | Adding Granadillas, Passion Fruit or Golden Apples and Tree Tomatoes to the Sixth Schedule of the Law. |
| 19th Sept., 1937 | Order under Law 4 of 1909 | Adding Tomatoes and Sweet Peppers to Schedule A. of the Law. |
| 30th Sept., 1937 | Notice under Law 30 of 1937. | Granting licenses to manufacture Edible Oil for sale locally in respect of year ending 31st March, 1938. |
| 2nd Nov., 1937 | Order under Law 31 of 1933 | Rescinding Order of 17th May, 1937 and fixing percentages of sugar manufactured in the Island to be exported and to be retained for local consumption at 89.76% and 10.24% respectively. |

No. 84